ENVIRONMENTAL ASSESSMENT BOARD

ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 6

DATE: Tuesday, April 30, 1991

BEFORE:

HON. MR. JUSTICE E. SAUNDERS	CHAIRMAN
DR. G. CONNELL	MEMBER
MS. G. PATTERSON	MEMBER

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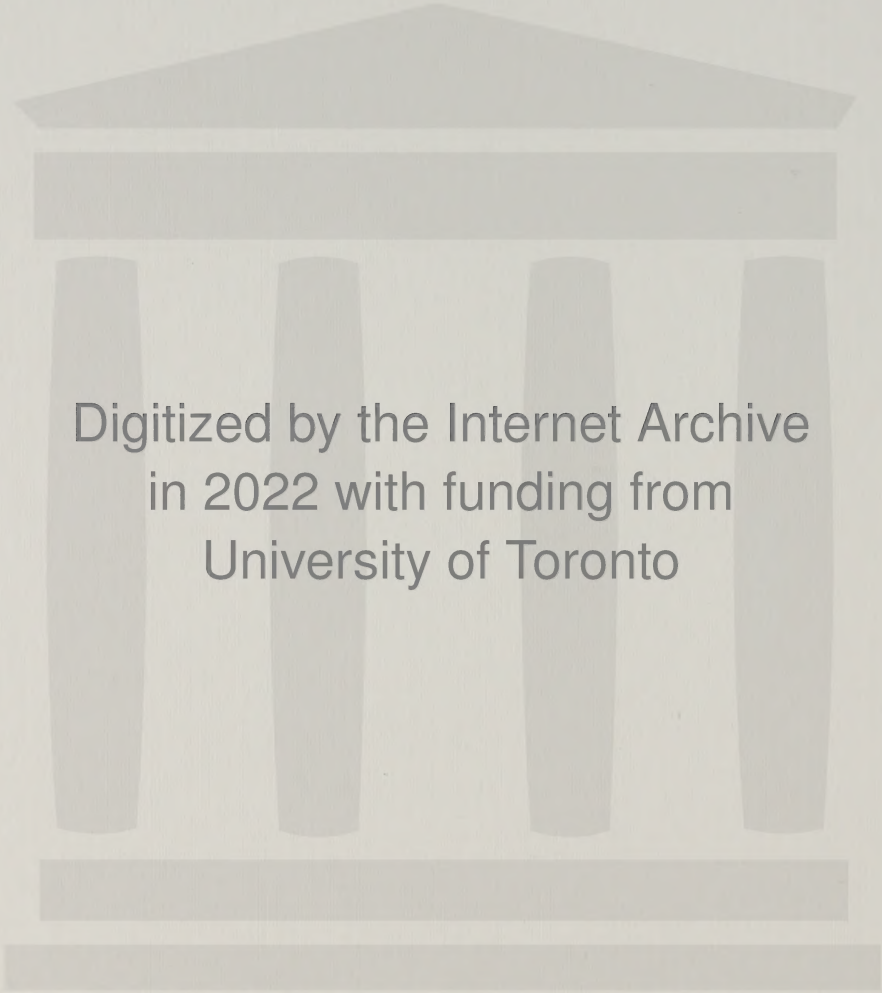

ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act, R.S.O. 1980, c. 140, as amended, and Regulations thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro consisting of a program in respect of activities associated with meeting future electricity requirements in Ontario.

Held on the 5th Floor, 2200 Yonge Street, Toronto, Ontario, on Tuesday, the 30th day of April, 1991, commencing at 10:00 a.m.

VOLUME 6

B E F O R E :

THE HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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S.& L. DIENER		
D. TAYLOR		

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L I S T o f E X H I B I T S

---Upon commencing at 10:00 a.m

THE REGISTRAR: This hearing is now in session. Please be seated.

THE CHAIRMAN: Mr. Mark.

MR. MARK: Thank you, Mr. Chairman.

Mr. Chairman, I understand through Mr. Campbell that Mr. Rothman has looked at the question of interest rates, which is one of the matters he took under consideration.

MITCHELL PIERSON ROTHMAN,
PAUL JONATHAN BURKE,
LILY BUJA-BIJUNAS; Resumed

CROSS-EXAMINATION BY MR. MARK (cont'd):

Q. So unless you have any objection, perhaps that is an appropriate place to begin this morning's proceeding, and I would ask Mr. Rothman to deal with that.

MR. ROTHMAN: A. Yes, thank you, Mr. Mark.

As you suggested, our forecast of real prime rates did increase by about 1.2 per cent from 1988 to 1990. To be precise, our calculation of the average real prime rate from 1991 to 2010 in the September 1988 outlook was 3.95 per cent; our calculation from the September '90 outlook was 5.15 per cent. So, that gives an increase of about 1.2 per

cent, as opposed to the 1.5 per cent that you had calculated, but they are certainly within the same general range.

I would make a few comments on this pattern. You had asked whether there had been a period in history where real prime rates had been that high over that long a period of time. The answer is "No." But I think it's worth noting that in our forecast, the real prime rates fall consistently, so that in the first five years of that period, from '91 to '95, they are 6.6 per cent, roughly 6-1/2 per cent, falling to 5.1 per cent in the next five years from '96 to 2000, then to 4.7 and 4.2 per cent for the last two five-year periods.

Now, if we look at those levels of real interest rates over that kind of period, they have, in fact, occurred at periods in the past. As one example, the average of the real prime rate from 1980 to 1990 was 6-1/2 per cent, roughly the same as our forecast for the first five years of this forecast. And, in fact, for the last five years of that decade it averaged 7.2 per cent above our current forecast for the real prime rate for the first five years of this forecast.

So, although that high an average hasn't

occurred over a 25-year period, we are not really forecasting it to occur over a 25-year period; rather, we are forecasting higher interest rates in the first part of the period with some decline over that period.

That's only partial. I am not trying to say that our forecasts are not high relative to historical experience over that long a period of time. They are. And I am not trying to deny that; I am only trying to say that it's instructive, I think, to look at the pattern of what happens over time.

In addition, we have talked about which interest rate forecasts are important for Ontario Hydro, and it's the forecasts of government bond interest rates that are the most important for Ontario Hydro decision making.

And in the period from the 1988 to 1990, our forecasts of long-term real bond interest rates have fallen. So that in September of 1988, our forecast for the average real interest rate on Canadian government five-year bonds was 4.1 per cent average for the period from 1991 to 2010.

Q. It doesn't change as a result of yesterday, does it, Mr. Rothman?

A. This is Canadian government, not Ontario government.

Our forecast in the September 1990 outlook for five-year Canadian government bonds, the real interest rate was 3.9 per cent, so that is a fall of two-tenths of a per cent. There is a similar fall of two-tenths of a per cent in the 20-year forecast where that is forecast to fall from 4.4 to 4.2 per cent real rates.

Essentially, what's happened here has been that we did reconsider our real interest rate forecasts as a result of re-consideration of demographic pattern of what we expected to be happening to savings rates, especially as the baby boom generation matures and moves on into retirement ages.

And that explains something of the higher real interest rates as we get farther on into the period because we change the forecast to produce higher savings rates for that generation after they retire.

And we have also changed the forecast of the yield curve, primarily because of this continuing problem with debt to GDP.

Our empirical work suggests that the level of interest rate is determined, at least in part, by the level of debt to GDP, not necessarily the level of deficits to GDP, not as much the deficits to GDP, but debt to GDP.

When there is a high level of government debt outstanding, somebody has to hold that debt and they are, therefore -- portfolio-holders are therefore forced to hold paper, to hold debt instruments rather than equity instruments, or rather than investments in real goods. And so they force a higher interest rate for that. They are forced into a higher holding of debt-type instruments than they might like and therefore interest rates on those debt-type instruments rise. So, that's at least some explanation of the change in the interest rate forecast.

Q. Just a couple of questions arising from that, Mr. Rothman.

Firstly, can you help me? How exactly do you calculate the 5.15 per cent average, because it is at odds with the number that we calculated. I would just like to know where you get it from and then we can recheck our calculation.

A. I will recheck, too. I think we did it by taking the interest rate that's in the forecast and dividing by the inflation rate that's in the forecast to get the real interest rate.

Q. Perhaps you could later, Mr. Rothman, just provide us with a brief written summary of the calculation?

A. Sure.

Q. Thanks.

Referencing the sources -- I assume it is table 8.2 from Exhibit 15; is that where you took it from?

A. Yes. Oh, I actually wanted to point out that, if we look at Exhibits 13 and 15, each of them has a table containing a real interest rate forecast. It's table 1.2 in both documents. If you look at Exhibit 15, table 1.2 has a line for real treasury bill rate.

Q. Yes.

A. And in Exhibit 13, table 1.2, which is in the front of this document, as opposed to the back of Exhibit 15--

Q. Yes.

A. --has a line for a real prime rate.

Q. And those are two different rates, however?

A. Yes.

So, we have been fairly explicit about those forecasts. And again, if you look in each of those cases, there is history as well as forecast. And you can see that the pattern is that the actuals that are shown peak in '81 to '85, and then there is a

pattern of continuing declines in those real rates -- well, the real rate, the real treasury bill rate peaks in '86 to '90, and then there is a pattern of continuing declines in the forecast.

Q. But do you understand what we are interested in is the real prime rate?

A. Yes, I understand. I am also trying to say that that isn't one of the variables that we focus on as hard in forecasting because we focus more closely on the Canadian government bond rates.

...

[10:14 a.m.] Q. I am told what we are looking for at the end of the day is one consistent set of numbers of real interest rates consistent between the two documents, and what we would like is the real prime.

A. Yes.

Q. And just lastly on this subject, Mr. Rothman, why are you forecasting the long-term bond rates to fall while the prime is increasing?

A. As I said, we are forecasting the -- it's a function of the yield curve flattening out because of this phenomenon, financial market's phenomenon, forcing medium-term and shorter-term rates up higher.

Q. And just to complete this, do I understand your previous -- pardon me, which of the various factors you have spoken about are ones which you identified between your 88 'forecast and today which has resulted in the lowering of it? You have given a number of factors explaining your forecast; I am interested in now knowing which factors arose in the intervening period between '88 and '90 that caused you to make the adjustment.

A. The lowering of the long-term real rate?

Q. Yes. You are changing the forecast

of the long-term real rate, change from your '88 forecast to '90 forecast.

A. That's actually a combination of a number of factors that I have mentioned. As I suggested, the demographic pattern might suggest a falling real rate, whereas the -- we also have at the same time lowered the inflation rates, the inflation rate forecasts since then and our study suggestions that real interest rates rise when inflation rates fall, because they are not -- the falling inflation rates are not sufficiently anticipated. And so there is really a very small change there, 2/10ths of a per cent drop in those medium and long-term real interest rates on government bonds, which reflect those offsetting patterns.

Q. All right, let's move on from there.

Dr. Buja-Bijunas, we were speaking quite a good deal yesterday about the models you use in your end-use forecasting. We devoted some time to the question of the floor space analysis, and there are a couple of things I would be interested in getting from you, if possible, that would simplify things that are rather important from our perspective. Firstly, let me ask you, would you be able to provide us with the - I am talking about the regression model you used to

project future floor space for building types - would you be able to provide us with the estimated equation that you used, along with the summary statistics, specifically the R-squared and T-values on coefficients?

DR. BUJA-BIJUNAS: A. There shouldn't be any problem with that. Yes, that is fine.

Q. We even have that here, do we? It doesn't have to be right now, if it's handy...

A. They are all documented.

MR. ROTHMAN: A. Yes, I have in my briefing material the 1990 material.

Q. As long as we know that it's available, we can --

DR. BUJA-BIJUNAS: A. You want the equations by building tag, with all the stats associated with the estimations?

Q. Yes, for 1990.

A. The 1990 forecast?

Q. Right.

MR. ROTHMAN: A. And for all building types?

Q. Yes.

The second thing I would like to know if we could get is the data files used to estimate the

equation, including the exact source of the data.

DR. BUJA-BIJUNAS: A. I am not sure, given that some of that is CANADATA.

MR. ROTHMAN: A. I have checked with my staff on the data source. What we use is an historical source that is a fairly long ago historical source. Some of it is the Middleton Associates Data, of which Dr. Buja-Bijunas spoke yesterday. Some of it is data from the Ontario Ministries of Health and Education, and they provide us with a history; from that there is a build up of a current stock, using CANADATA construction data in the interim.

So, we arrive at a current stock, not from a single data source but rather from a history, plus some -- a history of a single point, plus we build up a stock by getting construction data and assuming a demolition rate, and that is the source of the historical commercial floor space data.

I think as Dr. Buja-Bijunas explained yesterday, there have been a couple of interim -- a couple of Ontario Hydro surveys in the interim, and one of the reasons we considered that data reliable is that those surveys have agreed pretty closely with the data we found.

Q. You will appreciate, Mr. Rothman,

from some of the questioning, that we have got a concern about the utilization of the regression model with data which comes from a variety of sources and some of which is filled in, and we would like to do the best examination we can of the data you use in the data sources. So, I hear what you're saying, and I think I understood it yesterday: You get it from a variety of places and you consider it reliable. But I would like to have the best information we can get on exactly what the data is you are using. What are the numbers and where they all come from.

MR. BURKE: A. I just wanted to observe that the observation about the data being filled in--

Q. Yes?

A. --the only time that arose yesterday was not with respect to floor space forecasting; it arose in the question of the income -- sorry, in the modelling of the "other" category in the residential sector. That was the only reference to us having to interpolate between '73 and '81 in order to get a longer data set for modelling. All of the floor space data exists for each and every year; there is no filling in that's being done for this modelling exercise.

MR. ROTHMAN: A. When you ask for data,

I have two hesitations about that, about saying we can provide it. The first is that I don't know how much work it will be to reconstruct all of that reconstruction that we have done. We have it.

The second is --

Q. Sorry, you do have it?

A. I am told that we have it.

The second, potentially also important, is that I don't know to what extent the CANADATA are proprietary to CANADATA. That is a data base service to which we subscribe.

...

[10:25 a.m.] We don't have the right to make secondary distribution of the data that belongs to CANADATA.

MR. B. CAMPBELL: We know the nature of the request. We have a particular problem. I will contact Mr. Mark and we will see what can be worked out that is satisfactory to both sides.

THE CHAIRMAN: That will be fine.

MR. MARK: Q. In a similar vein, let's turn to the residential end-use model, and I would ask whether you would be able to give us the exact references to the source of the data for each year, particularly for the energy use numbers that serve as the dependent variable; is that possible?

DR. BUJA-BIJUNAS: A. By energy, you mean, residential energy use as a total, covering historical years?

Q. Let me rephrase it. I am particularly interested in the "other" category. I apologize.

A. Okay. The "other" as we have it in our modeling context?

Q. Yes.

A. And you want the "other" from '73 to '88? Is that what you are referring to?

Q. Whatever you use, if it is '90 or

'88.

A. Sure.

Q. Just to be clear, Doctor, we want all the data, not just the dependent variable, but we want it all including that one.

A. Could you please repeat that again? You want what?

Q. Yes. With respect to the "other" category--

A. Right.

Q. --could you provide us with the data used to estimate that category in the residential end-use model? And we want exact references to the source of the data for each year, including for the energy use numbers that serve as the dependent variable in the equation.

A. Okay. I would like to emphasize again what I was saying yesterday: The "other" -- the energy used for "other" is obtained by using the penetration rates from the market reference data set and the unit energy consumptions, multiplying them together to get an "other" category or vice versa.

We do have from StatsCan the total consumption of the residential sector on a year-by-year basis from which we subtract the consumption due to

space heating, water heating, or the other main categories from REEPS; either of the two ways you get an "other" category.

But you do have to take the penetration rates from the market reference data set for each appliance and multiply it by the unit energy consumption.

Q. But you used some data in the equation?

A. Yes. No, just the way you phrased the question, you asked me for something that is not published in StatsCan or something.

Q. Whatever you use.

A. Okay. That is fine.

MR. BURKE: A. Just to clarify that, it is the data you want, not the references for the data.

Q. I want both.

A. Well, I think --

DR. BUJA-BIJUNAS: A. I just explained it yesterday and today: It comes from the market reference data set.

Q. But what is your source for that? I mean, maybe I don't understand.

A. The Residential Appliance Survey, which I explained yesterday, is the source for that.

Q. Yes. Fine. And you don't do that every year?

A. No. It is done on every two or every three years.

Q. All right. And so for the rest of the years, how is that derived?

A. The in-between years are derived by the Energy Management Branch, a department responsible for putting together these statistics which are then given to us.

Q. Yes.

A. Now, the in-between years, they might rely on small intermediate surveys or other vehicles. I am not sure what they do. It is not the responsibility of the load forecast department to derive those numbers.

Q. I need to know where that comes from. I mean, just to say that they get it from somewhere, as you will appreciate, is not sufficient for my purposes.

So, if you could make some inquiries and give me the best detail you can; fair enough?

A. Fair enough.

Q. And Mr. Burke, I think it is most appropriate to turn back to you now. I want to ask you a few questions about the econometric models.

I have heard, and, I believe, in the testimony and have certainly seen in the documents a reference to a problem with the data for the commercial sector. Am I correct that you have referenced that?

MR. BURKE: A. Yes. In general, we are talking about the energy data for the commercial sector.

Q. Yes. And what is the nature of the problem, or the deficiency, you see in the data?

A. Well, we know most about deficiencies, or we perceive deficiencies most specifically for the natural gas consumption data for Ontario as published by Statistics Canada.

And the reason that it matters to us what the natural gas data is, is that in the model that we estimated in 1989, market shares in the commercial sector were determined interactively; that is, you could expect that elasticities for electricity would be impacted by the interaction with the natural gas information.

And so, while the major problem is directly how to analyze natural gas with the natural gas data that exists, it does have some implications for some cross-price elasticities and perhaps even own-price elasticities for electricity.

The specific issue that we found, and which our external Load Forecast Advisory Committee, which contained representatives from the natural gas industry pointed out to us on about two occasions, was that reported gas consumption appeared to be declining at times when the gas companies didn't feel it was.

And upon closer examination of the data set, it seemed that there were reclassifications of industries, particular companies or whatever, from the commercial sector to the industrial sector, or between different - yes, basically, that was the major effect - that were -- sort of introduced, as you might say, shocks to individual years, without Statistics Canada revising back the entire data set to be internally consistent over time.

I can't remember the exact year - there is a reference in Exhibit 77; I could pull it up if it was important to you - where the consumption of natural gas in Ontario appeared to fall significantly. And it seems to be attributed upon closer examination to a reclassification of natural gas customers in Ontario. So, that is the problem.

Q. There is no problem with the electricity consumption data?

A. Well, we don't know of one. I think,

you know, all energy data, one has to expect that, you know, you can't assume that is a 100 per cent perfect representation of reality at all points in time. But, it is particularly for natural gas that we are aware of a problem.

Q. Okay. And when did you first recognize this problem, or has it been one which you have known about for many years?

A. Well, I think it was either 1986 or 1987 where the time series for natural gas consumption took a dive when nobody expected it should.

And in the analysis in the following year, because all of its data is reported with a lag - I think in the model that was built for '88 and, I believe, also for '89 - we estimated -- our estimation resulted in cross price elasticities which did not make sense to us.

In discussing those results with members of the natural gas industries, particularly people from Consumers Gas, the source of the problem was traced back to -- or a potential source of the problem, anyway, was traced back to the data set itself.

...

[10:35 a.m.] Q. And is this a problem you were aware of and corrected for when you prepared the '88 forecast which underlies the plan document?

A. Well, I am not sure the extent to which the '88 forecast was impacted by that problem. It could be that '87 data was the first year that was particularly problematic, although I think we have, subsequently, in the course of correcting for what seems to have been a one-time shift, adjusted data back to the early '80s.

Q. Turning for a moment to the residential sector of the EEMO model, Mr. Burke, do I understand correctly that you have complete sectoral aggregation with respect to this sector; there is no disaggregation at all?

A. That's correct. We are modelling the entire residential electricity and natural gas and oil consumption, but not below the sectoral level.

Q. And would you expect price elasticities in all-electric households, that is, households which use just electricity, to differ from those in non-all-electric households.

A. I would have to consider that carefully. Certainly the effect of looking only -- are you talking about the own price or the cross-price

elasticities now?

Q. Own price.

A. Own price. I can't really comment on that; I don't have the data to know.

Q. Do you know what other utilities have found on that subject?

A. I don't know of utilities that have found something on that subject.

Q. Would you think, Mr. Burke, that all-electric homes tending to be newer than average, and having more electrical appliances, may give you different elasticities than non-all-electric homes?

A. For own price?

Q. Yes.

A. So, there's only one elasticity we are talking about?

Q. Yes.

A. It's possible.

Q. And I take it from -- do you --

A. I should point out that for existing houses, once the heating system is installed, it's fairly inflexible as to what one is going to do about the price change in the fuel. So, offhand, I cannot speculate as to where that elasticity would go.

Q. But they may be more susceptible to

measures, such as turning down the thermostat, for example?

A. Certainly. But I don't know.

Q. Do you know whether disaggregation between electric and non-electric housing is common in utility forecasting in North America?

A. Well, I must admit we have not particularly looked at that, because we don't have the equivalent data ourselves.

Q. That was going to be my next question. So, you don't have the data available to model these two components of that sector separately?

A. That's correct. Or we might have been interested ourselves.

One of the things you have to realize about our situation, Mr. Mark, is that we are a wholesaler of power for the most part, and a lot of the data that one might need for this resides with our customers.

Q. Turning for a moment, Mr. Burke, to the industrial sector. Do you also there have complete sectoral aggregation in your model?

A. Yes, we do.

Q. Would you agree with me, Mr. Burke, that there are significant differences in intensities

between the major industrial categories?

A. That's one of the points we have made, yes.

Q. And, for example, process industries have an intensity of approximately four times greater than the fabrication industries?

A. Yes, that is a point that Dr. Buja-Bijunas made, yes.

Q. And do you have available to you, or could you obtain with some effort, the data necessary to model these sectors separately?

A. We have at least one or two interrogatory responses on that topic which I can hunt out for you. Essentially, we tried and we had at the two-digit level, econometric modelling efforts for each and every two-digit industry, but in 1985, Statistics Canada ceases to collect the data that we required to continue that modelling effort, and so we had to abandon it. And, unfortunately, it is not possible to continue that.

We have even investigated whether, in gathering its data, Statistics Canada has tapes which we could process ourselves to access the provincial level detail that we required; but, in fact, what was changed was the survey technique by Statistics Canada,

and they no longer consider data at the provincial level reliable. It's an insufficient survey to gather that information. It's an unfortunate change. We had, in fact, invested a fair bit of effort in that modelling exercise.

It is part of the indepth system. You may be familiar with the fact that there are several types of models that the indepth EPRI system anticipated, and we had gone pretty well all the way to implementing an econometric version of that at the two-digit level, and were very frustrated to find out that the data set was discontinued.

Q. Mr. Burke, has Hydro estimated any single equation econometric models to forecast load?

A. Mr. Mark, I think from your experience at the Ontario Energy Board, you are aware that we do estimate single equation models for load for short-term forecasting purposes. And also, you are aware that, from our discussion of uncertainty bands, that we have a model which we use for the purpose of simulating the uncertainty bands that is a single equation model for load.

Q. What about long-term load forecast?

A. For the long-term load forecast specifically, we do not use single equation models.

And I went into some -- well, I addressed the issue of why we don't consider that an appropriate thing to do for long-term forecasting in my direct evidence.

Q. Let me ask you this -- and if you haven't considered or can't respond, that's fair. But if one were to construct a single equation econometric model to do the long-term load forecast, can you be of any assistance to me as to what variables it would be appropriate to include in such a model?

A. I think there is a very general class of variables that are included in all load-forecasting exercises, and we have described those in various places. Essentially, a typical model would have some measure of economic activity, such as real GDP, some measure of electricity prices, some measure -- or try to find a relationship between other fuel prices.

And after that, it would probably be more successful if the data was weather-corrected, or you included weather variables on the right-hand side of the equation.

What I am describing to you is, in fact, the equation-type specifications we use for the short term, but which we do not consider a valid way to forecast the long-term, because of the very differences in intensity by sector and within sectors that you

alluded to earlier, that are not captured at the aggregate level.

Q. And can you be of any assistance to me, Mr. Burke, in how long the lags would be for those various explanatory variables that you mentioned?

A. Strictly speaking, from a theoretical perspective, a long-term model should have no lags in it whatsoever; but in practice, you probably would have -- you could have any number of lags. It depends really on the empirical estimation. A good modeller would test a variety of lag structures to see which is the optimal one.

Q. What about price? Can you give me particulars?

A. My comments pertain to all variables.

Q. Lastly on that subject: Can you tell me what you would consider to be an appropriate functional form for such a model?

A. Well, I think that's really asking a lot. There are many functional forms; we have tried several of them ourselves. And essentially, there is a theory of derived demand that's at work here, and demand that crosses between the production and the consumption perspective, because we are both modelling the consumers and the producers -- sorry, modelling the

use of electricity by producers and consumers, if one wishes to take an aggregate approach. And so, the sources of possible specifications are numerous.

Ultimately, a reduced form approach is probably reasonable, given the mixture of consumer and producer decisions that are trying to be captured by a single equation. As I say, I think it's incorrect to try to do this, and therefore the approximations that one comes up with in so doing, really is in the hands of the modeller.

Q. Looking at the overall results of your forecasting for a moment, Mr. Burke, you came out with a difference in the commercial sector, between the EEMO and the end-use models, of approximately 25 terawatthours; is that correct?

A. That is correct.

Q. And as I understand it, you decided to essentially adopt the end-use results, subject to a 5 terawatthour increase.

A. That's correct.

Q. And can you tell me, specifically, why it is that the EEMO model, in your view, over-estimates the consumption in this category? Is there anything different than the data problems that we discussed a few moments ago?

A. Well, I think my assessment is in relation to the specifics of the end-use forecast. If I did not have an end-use forecast at my disposal, I don't think I would be able to make this judgment as comfortably, and that is that certainly the commercial sector has been growing rapidly in the past.

I had pointed out, I think, that we felt that the equation was reacting to the recent strong growth in the commercial sector, that is, from the mid- to late 80s, and so picking up a very strong trend toward the end of the historical period, which we don't believe would be sustained, and is associated with a construction boom which was clearly of a cyclical nature.

But I think it is in relationship to the end-use forecast, where, in looking at the individual components, and looking at what we have in our forecast for the "other"s and the "miscellaneous" and so on categories, that it seems hard to imagine that the econometric model is forecasting at the right order of magnitude.

Q. I'm sorry, just on the last point. Is that simply, then, a comparison of the projection of EEMO with your end-use, and you simply say that your end-use results should dominate in your analysis? Is

it as simple as that?

A. No, it is not as simple as that. It is not because they are end-use that they should dominate. It is because of the various growth rates by end-use that we have modelled explicitly, and the expected growth rates for the "other" category and so on, that we do not believe that a much higher forecast than the one which we have modelled on an end-use basis is appropriate.

And given the range of results that we have derived for the commercial sector -- that is, we have a result which is the best statistical result that we could derive this year, having looked at the commercial sector econometrically in some detail, but, it is not a very stable result and it is certainly much higher than the year's before result, and it is concocted with -- sorry, not concocted, I shouldn't have used that word. It is produced with data which is questionable to us, and we have emphasized that commercial sector data is the most unreliable of the three sectors.

...

[10:50 a.m.] It, therefore, when it comes up with a result that is particularly high, seems questionable.

It's also well recognized, I think, that it is in the commercial sector that we expect, in our efficiency improvement programs, to see the greatest efficiency gains. There is some sense that there is a strong potential for efficiency gains in the longer term, that is, beyond the year 2000, in the commercial sector, that may not be captured by this econometric system.

Q. Is that through demand management programs?

A. The technologies that we look at for the demand management programs indicate that that is where the potential for efficiency improvement lies, the largest potential in the commercial sector. There is some sense that that should rub off, especially in the longer term, on efficiency gains that will occur in terms of technologies adopted in the commercial sectors.

So that, if anything, one would have expected the commercial sector to have perhaps more moderate rates of growth than those implied by the econometric forecast.

Q. The efficiencies achieved by the

corporation's demand management programs enter into the analysis only after you do your forecast of basic load?

A. That's quite correct. I am just talking about the fact that there are technologies that are coming into the marketplace which will become increasingly economic for consumers to adopt on their own beyond the year 2000 and so, tend to suggest that efficiency gains should be increasing in the longer term.

Q. And when you do your end-use modelling of your office commercial category, is that assumption worked into that process?

A. Yes, we have efficiency gains built in there and that's why to find that the econometric model produces this extremely strong growth. It really comes down to, would you expect the "other" category, that I think we discussed yesterday, to grow much faster than we have already got it growing, and given that we feel that we have fairly well captured major end-uses, like lighting and so on, as they stand. And our judgment was they would not grow much faster. In fact, we could only feel comfortable with adding 5 terawatthours to this miscellaneous category in producing a commercial sector forecast.

Q. So, in essence, this is really an

analysis of that other sector?

A. It boils down to the fact that we have a fair bit of confidence, relatively speaking, in the specific end-uses. We look in the commercial sector and projecting the growth rate for "other," there are certain plausible limits to what we think that could be.

Q. How many years of data do you use in the commercial EEMO model?

A. Pardon me?

Q. How many years of data, of historical data, do you use?

A. All of the models in each sector is modelled with data from '62 to '89.

Q. And in estimating the parameters, then, the mid-80s data would be of no greater importance in the model than the data, let's say, of the mid-70s?

A. In a certain sense. But certainly the fact that there has been rapid growth in the five years, from about '85 to '89, factors in fairly substantially. The 1960s was an extremely rapid growth period for the commercial sector. There were only a few years where growth slowed down in late '70s and '80s and it resumed its growth.

Q. But that's also when the real price went up?

A. Pardon me?

Q. Went down, pardon me.

A. Which real price?

Q. Of electricity. In the '60s, it was going down, was it not?

A. It was declining modestly, probably at a rate of 2 per cent real per year. But commercial growth was about 12 per cent per annum in the '60s through to the early '70s.

Q. I am told, Mr. Burke, and tell me whether I am right or wrong, that the econometric model that you used, EEMO, by its nature, and one of its purposes is to avoid the problem that you find, for example, in time series models, of giving undue emphasis to the recent past. And that with the data --

A. I am not saying there is particular emphasis on the last part of the '80s. I am saying the last part of the '80s were very strong.

Had we had a different data set for the last part of the 80s, we would probably also have a different forecast. I think that's a reasonable assumption. Its weight is no bigger than any other period. But, the fact is that we had very strong

commercial sector growth of the order of 6 or 7 per cent per annum for about five years in a row there, which makes a difference. It's certainly a lot different than it would have been had we experienced one per cent per annum growth for the last five years.

Q. You are not suggesting, are you, Mr. Burke, that with a data set going back to 1962, that you have to do some additional work, and that is, judgmentally carve down the impact of the period of growth for one segment of those nearly 30 years?

A. As a matter of fact, we are trying to produce a sort of a long-term cycle-free forecast, and I am maintaining that the period from about '85 to '89 was a boom period cyclically for the commercial sector. For instance, if we have another four or five years of data, you will find that the commercial sector will not grow very strongly at all. Everybody appreciates that we have surplus commercial space in Ontario. And so, if we cyclically average this data five years from now and perform the same analysis, we would expect to get a trend coming out of that analysis which is lower than the one you would get, having only gone halfway through the cycle.

Q. Don't you get your best assessment of what a long-term forecast is going to look like, by

indeed taking a representative number of years which have both ups and downs, and seeing how it averages out in the long run?

A. Well, you face a hard decision, Mr. Mark, whether you wish to cut your data set off at some point and ignore the last four or five years of information, or model with it, and then try to judgmentally correct for it.

Q. And in your GDP modelling, you have already come to a result which you think smoothes out the cyclical impacts; is that fair?

A. For GDP as a whole, the potential growth approach that we take smoothes that out, yes.

Q. And is that GDP growth projection an input into the EEMO model?

A. It certainly is.

Q. So, by the time you run the EEMO, you are already using a levelized, if you will, GDP projection which compensates for the cyclical impacts?

A. I think we are talking about two different things here, Mr. Mark. We are talking about how we fit the historical equation, and then we are talking about how we forecast it. Certainly for the forecast we are working with cyclically-adjusted, cyclically-neutral, long-term GDP values, but

historically we don't do that. We use actual GDP data and actual loads in each year to model each sector.

Q. The growth you are referring to, in the mid- to late-1980s, was that due to the high GDP?

A. There are two components to the strong commercial sector growth. Certainly GDP growth itself was strong, but also, if you examine a historical time series of commercial building additions, floor space additions, the addition of floor space in the '86 to '89 period, particularly, was at levels that had not been seen since the early '70s in Ontario. It was a substantial sort of increment to the floor space in Ontario in those years.

Q. I think Dr. Buja-Bijunas told us yesterday about the process of generating results on the end-use models over the historical data you had, and then adjusting the coefficients. Other than that process, have you validated the end-use models at all? Is there any mechanism available to do that?

DR. BUJA-BIJUNAS: A. There is not a great deal of data available to do that sort of thing. Certainly end-use data does not go back to 1962 or anything like that. So, most people, when they do end-use analysis, you will find that they start in the mid-80s or so. It's very much present-oriented,

base-year-oriented.

Q. So, then, other than that process you told us about, there is nothing you have done or can do to validate them?

A. What we have done is, to the extent possible, looked at historical data on individual parameters, such as historical sales levels for various models of appliances, to see how efficiencies have changed over time. Individual factors like that, as opposed to reproducing an entire forecast over the last 20 years or something. We do use historical data for validation of individual parameters that feed into the end-use forecast.

Q. But you haven't tested the whole model by running it over some portion of your historical period?

A. The only thing we did was we based the commercial sector in 1982, and we based the residential sector in 1978, and ran those two examples, which I discussed yesterday.

Q. And how long has Hydro actually been employing the end-use models in the forecasting process?

A. I think we started seriously looking at end-use analysis back in '84 or so. 1986, I think,

was the first real year that the models were advanced enough, or had sufficient data, so that we had end-use models that could be defended. I would probably say '86 was really the first year when they were a solid input.

MR. BURKE: A. My recollection is the same, that it was in the '86 load forecast report that we first - but we could check that, if it is important to you - that we first started the process of reconciling between what was the econometric model and the end-use model for preparing the forecast.

MR. ROTHMAN: A. We have had end-use models before that. Dr. Buja-Bijunas and Mr. Burke are referring primarily to the EPRI end-use models.

DR. BUJA-BIJUNAS: A. No, I referred to the old end-use also.

MR. ROTHMAN: A. In any case, it's my understanding we started -- there was some end-use modelling activity that started in 1980, '81 or thereabouts, in Ontario Hydro and continued. There was some continuous end-use modelling activity through that period, but until, roughly, the time that Dr. Buja-Bijunas and Mr. Burke are talking about, that activity was in the form of one or two people trying to run, or running, a model that was obtained from the

Ontario Ministry of Energy. And its results were reported in the forecast in 1983, but their dates are correct for when it became an important part of the load forecast process.

Q. And do you do, or have you done, any form of analysis to test the accuracy of the forecasts produced by your end-use models?

THE CHAIRMAN: I thought you already asked that question.

MR. MARK: I am talking historically. I am sorry if it wasn't clear.

DR. BUJA-BIJUNAS: We have an interrogatory where we actually did do that. I will have to look it up. We do compare each individual sector, residential, commercial, industrial, versus the actuals, starting with the '86 end-use forecast, going to the '89 end-use forecast. But I will have to find out which interrogatory it is.

...

[11:04 a.m.] MR. BURKE: I think you can appreciate, Mr. Mark that, therefore, these are short-term forecasts' results.

MR. MARK: I understand. I understand.

All right. Thank you, panel. Those are my questions. Thank you, Mr. Chairman.

THE CHAIRMAN: Thank you.

Mr. Rodger?

MR. B. CAMPBELL: Mr. Chairman, there are some matters that are outstanding with this panel; for instance, I know Mr. Rothman had undertaken to check the National Energy Board forecast of gas prices for Mr. Mark.

I am not sure, but I believe he was ready to speak to that one this morning. And perhaps just before Mr. Mark leaves, any of the ones that he has, I would like him to clear up while Mr. Mark was still here.

I think the first one of those is the National Energy Board average wholesale price for Ontario? I believe, Mr. Rothman, you are ready to deal with that.

MR. ROTHMAN: Yes. The National Energy Board forecasts are only in current dollars. Their forecast for the year 2010 in current dollars for the

wholesale price of natural gas in Toronto is $13.95.

Our forecast for the same gas in current dollars in the year 2010 is $13.86.

Now, there is a difference in growth rates, because they start from $2.73 in 1990, where we start from $2.58 in 1990. So, their growth rate is 8-1/2 per cent over that period, and ours is 8.7 per cent, but I sure have to call those as pretty close.

MR. MARK: It is a matter of opinion, Mr. Rothman. I am sorry, you are correct.

All right. Is that it, on the subject of natural gas then?

MR. ROTHMAN: Yes. You just asked for those prices; I just wanted to give you the numbers.

MR. MARK: That is fine.

MR. B. CAMPBELL: All right. I think there are, and arising out of today, a few other matters, and once we have those, we will just deal with them directly.

THE CHAIRMAN: I wonder if the way to deal with them wouldn't be - I haven't thought about this - but perhaps they may be done in the form of short written answers, which then can be filed into some other series, rather than bring Mr. Mark and the panel back to have to deal with them.

MR. B. CAMPBELL: That would be satisfactory to us.

THE CHAIRMAN: Maybe we should open another series, distinct from interrogatories, and distinct from exhibits, that deal with these kind of things. Some kind of a code, I don't know, so that they are segregated; they don't get lost.

MR. B. CAMPBELL: Why don't we give some thought to that and we will come up with some scheme that we will recommend to you.

MR. MARK: Mr. Chairman, if I can just deal with one last matter. You will recall, during the cross-examination last week, in our bundle of exhibits, there was one in particular dealing with the uncertainty ranges, where at the suggestion of Mr. Burke, we pencilled in some changes to the numbers, because of the year and the data set.

We have revised, in typewritten form, that table, with the numbers inserted that Mr. Burke had referred to in evidence, and it may be simpler if we filed this as another exhibit so that the record is clear.

THE CHAIRMAN: Number?

THE REGISTRAR: 106, Mr. Chairman.

MR. MARK: And that, for the record, is a

revised version of what was page 4 of Exhibit 102.

---EXHIBIT NO. 106: A revised version of what was page 4 of Exhibit 102.

MR. MARK: Just to be clear, Mr. Chairman, on the subject of the answers to the undertakings, I am quite confident we will be able to work out a system to file written answers, but I do want to reserve the right to speak to the panel, if necessary, if I have further questions.

THE CHAIRMAN: Of course.

MR. MARK: Thank you.

Mr. Rodger?

THE CHAIRMAN: Are there any documents we should be digging up, Mr. Rodger?

MR. RODGER: Yes, Mr. Chairman. There are two interrogatories that I will be referring to, one of which I have referred to already, 1.24.11.

THE CHAIRMAN: Just a moment.

MR. RODGER: Yes, and I will hand out one additional interrogatory, 1.7.35.

Mr. Chairman, with me today is Mr. Larratt Higgins, who is an economist, and who has rather extensive load forecasting experience. And you will also see Mr. Higgins on the AMPCO panel, dealing with economics and load forecasts, when we get to that

stage.

THE CHAIRMAN: Thank you.

MR. B. CAMPBELL: Mr. Rodger, can I have the second interrogatory number? I just haven't turned it up.

THE CHAIRMAN: I have 1.7.35; is that right?

MR. RODGER: That is correct. That is from the Coalition of Environmental Groups. I handed them all out already.

MR. B. CAMPBELL: Thank you.

CROSS-EXAMINATION BY MR. RODGER:

Q. Panel, over the past -

THE CHAIRMAN: Just a moment. I am not sure we are all ready yet.

MR. RODGER: Oh, I am sorry.

MR. B. CAMPBELL: Have you got your binder reassembled, Mr. Burke?

MR. BURKE: Somebody is doing that for me, thank you. It is okay. I have got the interrogatory I need.

THE CHAIRMAN: All right. Mr. Rodger, you can proceed.

MR. RODGER: Q. Panel, over the course of the past few days, we have heard a lot about both

the econometric and the end-use analysis that Hydro employs. But I want to get a sense of where this analysis fits in, or how it compares to what other utilities do, in both Canada and the United States.

How does it compare and contrast to the approach that Hydro takes?

Mr. Burke, would that be most appropriately put to you?

MR. BURKE: A. That is a fairly general question, but I think if you are asking, do other utilities use econometric and end-use models, in broad terms, I can say that there has been an evolution in the models used by utilities across North America; that by the late 70s, early 80s, most of the forecasts were prepared using econometric modelling techniques. And increasingly over the 80s, most utilities have adopted end-use forecasting methods. And a few of them - and I think, really, only a few - still maintain the capability to do both that we maintain.

Q. And which utilities would they be?

A. Well, I don't know -- sort of, I haven't done a census of them, but I do know that, for instance, Tennessee Valley Authority, I believe, has both, and Bonneville Power Authority.

If you give me a minute, I can look up to

see whether some of the other California utilities -- no, actually, I am quite sure that if the California utilities have econometric modelling methods, they are fairly simplified ones, because of the emphasis for affording by the California Energy Commission in end-use terms.

So, my sense is that, because of cost reasons, most utilities have chosen to focus on one modelling type, and perhaps for regulatory reasons in the U.S., they have focused on one modelling type.

In Canada, I believe that Quebec Hydro certainly has end-use modeling approaches. And I have to admit, I have not seen reported results, if they have an econometric sort of modelling sort of complement to their end-use activity or not.

BC Hydro, I believe, uses a mixture of end-use and econometric methods; that is, some sectors are done from an end-use perspective; some sectors are done econometrically.

I think if you wanted a more comprehensive or a more accurate, perhaps, assessment of the relative roles, we would have to go back and just check specifically for a group of utilities, if you are interested in being absolutely sure what the relative contributions of each approach is to their

forecast.

Q. Would it be fair to say then that it is the generally accepted wisdom among utilities - if we just stick to North America - is either a combination of the econometric and the end-use analysis like Hydro has done, or one or the other; either using the econometric or the end-use?

A. I think that is fair to say, yes.

Q. Are there other methodologies, or other analyses outside those two entities, of the end use and econometric, which other utilities may use?

A. For forecasting purposes?

Q. Yes.

A. I don't believe so, no.

Q. Is it appropriate when we speak of these two methodologies to talk about a hierarchy of analysis? In that, I mean, one approach is seen as more sophisticated or a more complex analysis than the other?

A. No, I don't think so. I think they are different; they have different strengths and weaknesses and they each, as in the direct evidence, bring insight to bear on the future.

As I mentioned in my direct evidence, the econometric approach must operate at a more aggregate

level, because it works with official time series information that must have been collected over a long period of time, in order for a model to be estimated; that is, I should say, a time series econometric model, which is the nature of most of the models that attempt to forecast the load econometrically.

With the end-use analysis, essentially it works with cross-sectional information which may be gathered over time; that is, in different years, surveys are done, but it is not really the case that there is much time series information available at the specific end-use level.

And there is econometric analysis of that cross-sectional data. Don't get me wrong. It is not that economics never enters into end-use modelling, but it is of a different kind of econometric analysis, just by its nature, than the time series modelling would derive.

And I pointed out in my direct why it was that going to the end-use level offered insights that you couldn't really capture at the aggregate sector level, to do with changing intensities associated with the different compositions -- sorry, I am not being clear. The differing composition over time of each of the sectors, and the intensities of each of these

sectors, each of these components of the sector is sort of -- again, I am not being clear.

Because the composition changes over time, and each portion of a sector has a different intensity, the mix results in a different intensity for that sector over time, which may not be well captured econometrically, when analysed at the aggregate sector level.

Q. Now, when I asked you a minute ago about how Hydro's approach compared with other utilities, you indicated that one of the factors why some utilities may not use the same approach as Hydro is because of costs. I wonder if you could give me a sense of resources that Hydro expends on their forecasting.

And when I mean costs and resources, I mean in terms of number of staff, yearly budget, hours that go into the forecast. I just want to get some kind of sense of what is involved from your end.

A. Well, I can give you a broad sense, but if you want specific numbers, that is not part of the material I brought with me today, so I would have to go back to check.

But the load forecast department, which includes the activities we do for the short-term load

forecast, which requires a customer level forecast in a much more disaggregated forecast in terms of time, that is a group of about five people.

And then there is a total of about eight people that work on the long-term; six in the end-use area and two in the econometric area. And that is, of course, when we are at full complement. That is what we have budget for. And then there is me.

...

[11:20 a.m.] Q. And how much time is involved in preparing, let's say, your long-term forecast?

A. Well, in a sense, it never really stops. The forecast is run on our models, just using the sort of months of the calendar year to, sort of, make a reference. It is usually run in July and August, the first time with the versions of models as they have been developed to that point in the year, and the forecast is refined through to the end of October. At which point, it is presented through the external review process and the internal review process I described in my direct.

And the reports are written up and so on. And then, after Christmas, we start on developing the models again for the following forecast.

Q. So, essentially, it is a full-time year-round operation?

A. Yes.

Q. Would you be able to get me a budget for your computer, when you run the various data through the models? Do you have a set budget for that each year?

A. I would point out to you that that is less and less of a factor as we use personal computers and so on. That budget is falling, thank goodness,

actually. I mean we could get it for you, but I don't think it would tell you very much.

Q. If I could just restrict my request to -- maybe you could identify the amount of people involved in --

THE CHAIRMAN: I think he told you that.

MR. RODGER: All right, so --

THE CHAIRMAN: I am not quite sure why you need that particular piece of information. Could you just explain to me why you need that, having been given the organization, personnel, and the equipment used?

MR. RODGER: It goes to some interest my client has on how the load forecast is formulated; and as part of our evidence, later down the road, is how different approaches to load forecasting - and some of them are a lot more simple approaches than others - and how the results of the different processes compare to one another. And so that is why I wanted to get a sense of the amount of resources that Hydro --

THE CHAIRMAN: He has told you the number of people, and the department works full time. He has told you the equipment he has got. What is going to be added if he tells you the cost, or the budget?

MR. RODGER: All right. That's fine.

Q. We have also heard that Hydro, almost on a regular basis, changes parts of its models as approaches to those models, and I understand that one prior model that Hydro used was called the IDFN model. Are you familiar with that, Mr. Burke?

A. I don't remember the specific details of it, but I remember there was a single equation model with that acronym for an identifier.

Q. And I understand that this model was used by Hydro up until about 1986; is that right?

A. I think the model was run until -- I don't know whether it was as late as 1986, but I am not sure what the use of it necessarily was.

Q. So, you don't know whether it was a long-term or a short-term forecaster?

A. I don't know whether it was used to produce the load forecasts for any particular year that existed.

MR. ROTHMAN: A. I guess I have to talk to that.

You are getting into an era before Mr. Burke was the manager of load forecasts. And shortly after the economics and forecasts division was created by the merger of what had been an economics division and a loads forecasts' department, there was a period

of about six or seven months during which we had no manager of load forecasts, and so I, as the chief economist, undertook the responsibility for the load forecasts.

It was during that period that the IDFN model was developed, as an evolution of a previous single equation regression model. That previous model was called ARDNASSAC, A-R-D-N-A-S-S-A-C. Both of these models were annual, single equation, regression models, used for the purposes of the long-term forecast.

I had that model created in order to provide additional information along with the then existing end-use model. But the model that was basically used for the forecast was the then existing econometric model EDEM, E-D-E-M.

So, what I had, then, was an econometric model that essentially provided the load forecast, a multi-equation econometric model that essentially provided the load forecast, with a single equation regression model to provide some additional information about what a simple look at the system like that would produce. And an end-use model to provide some information about how an end-use look at the system would produce a forecast.

Q. So, the IDFN model was used as

somewhat of a check, then, against the --

A. Yes, to provide additional information to what the multi-equation econometric model provided.

Q. And in your opinion, what was the value of that IDFN? How did its results actually compare to the more complicated econometric model?

A. As I recall, they tended to run higher than the multi-equation model.

Q. And how did that compare them, to what actually was required, in terms of the load for the period in which it was was used?

A. If you had looked at that as a medium, short- to medium-term model, it probably would have performed better than the econometric model. But we were really not using that econometric model before about five years. We had fairly simplistic ways, I think, of a middle period forecasting.

Q. But for the purposes that you were using it for that IDFN, it was quite an accurate analysis, the way it turned out?

MR. BURKE: A. Well, if you are talking about long-term forecasts that were made in the early '80s, we don't really have much experience of them yet.

Q. But on a short-term basis?

A. Well, for a short term, that is a different question. I mean, is it a short-term technique or isn't it? I mean...

Q. And in your view, it was a long-term technique?

MR. ROTHMAN: A. It was intended as a long-term technique. I don't know if there is much use in bandying words here, Mr. Rodger. We are all aware that in the early part of the 1980s, from about 1983 or late 1982 on, until quite recently, the forecast had been low.

In my view, that was at least partly a result of what had been an overreaction to the 1981/82 recession that got built into a forecast that occurred in late 1982. Subsequent forecasts all increased from the level that was established then.

But any kind of alternative forecast that had been available that would have been higher would happen, in the event, to have been more accurate to have given a lower forecast error. So, yes, the suggestion that you are making, then, if that single equation regression model produced a higher result than the multi-equation regression model, its ex post forecast accuracy would have measured better than the multi-equation regression model through much of the

'80s. The answer is probably yes.

But I don't think you can take that as an indication of a significantly greater worth of single equation regression models. It tells us about what I expected: that that model would be likely to forecast higher than the multi-equation model, and it did. And I expected that the end-use model would forecast lower, and it did.

Had Hydro's forecast been chronically over-forecasting, then the end-use model would have looked great for that period. I don't think it's worthwhile to draw general conclusions from that circumstance.

MR. BURKE: A. I would like to add something to that, and that is that the reason we do use single equation models still, for the short-term period, is that the sort of factors that I would expect a multi-equation system to be able to pick up for the long term are not things that change dramatically in the short term. That is, compositional shifts in the economy and the sort of intensity changes that occur within sectors; that sort of thing is not something that changes in a two- or three-year period to a marked degree, except for cyclical factors, not long-run factors. No, you are assessing different kinds of

forecast performance if you are looking at the short-term performance or the long term.

THE CHAIRMAN: Would it be convenient to take the morning break now, Mr. Rodger?

MR. RODGER: That's fine, Mr. Chairman.

THE REGISTRAR: We will recess for 15 minutes.

---Recess at 11.30 a.m.

---On resuming at 11:48 a.m.

THE REGISTRAR: The hearing is again in session. Please be seated.

THE CHAIRMAN: Mr. Rodger.

MR. RODGER: Q. I wonder if you would turn, Panel, to Interrogatory No. 1.7.35, please. This interrogatory was asking about the differences in the 1990, 1989 and 1988 load forecasts and explaining the differences in these forecasts.

And if you could turn to the last page of that interrogatory, to the second paragraph, it is just a couple of lines. I would like to read it:

> "The EEMO model forecast for 1990 is much higher than the previous basic load forecast due mainly to the respecification of the commercial sector.
>
> "As in 1989, the 1990 load forecast

has moved closer to the end-use forecast and further from the EEMO forecast. It is this judgment that results in a slightly lower forecast in 1990 than in 1989."

Now, I don't want to talk about the respecification issue. That has been dealt with. But it does give a good example of the judgment that has been talked about earlier on.

And in this paragraph, in response to this interrogatory, that judgment has been used to lower the forecast or lower the result from the EEMO model. And my question to you is: Given what you have stated earlier about how the EEMO forecast, it's really a year-round process and there are quite significant, I would say, resources put into this model to get these results. Does it give you concern, as a forecaster, that at the end of the day when you get the result from the EEMO model, you then apply your judgment to lower that result? Does that give you concern as to whether the EEMO model is still an appropriate exercise to undertake?

MR. BURKE: A. I really think you are posing the question incorrectly. We have stated many times that each modelling system has strengths and

weaknesses, and we look at the strengths and weaknesses of each of them. And you could have said just the opposite: that we put so much effort into the end-use model, why should we raise the result from the end-use model, taking into consideration the EEMO model.

I think I went through, in quite a bit of detail, with Mr. Mark, the sorts of considerations that go into why we felt the commercial forecast from EEMO was too high. Why we felt the end-use model forecast for the commercial sector in most end-uses was probably appropriate, and that the sorts of factors which tend to raise the EEMO results, and the concerns we had about it, and the concerns also we might have about end-use forecast for the commercial sector.

The fact that there are some trade-offs that we make in combining two modelling systems doesn't cast doubt on either of them. The purpose is to gain information by using both. It is not a either/or. One isn't useful just because we choose the other or we weight closer to one than the other. The idea is to gain information of different kinds from analyzing all of the data we have available to us.

Q. So, Hydro is not coming to the view, then, when looking at its forecasting program generally, that one particular model, the end-use

model, is more valid than the econometric?

A. I indicated in my direct evidence, and I believe it is discussed in the methodology section of our annual load forecast reports, that there are things about econometric models that are extremely valuable; otherwise, we wouldn't continue to work with them. They pertain particularly to the difficult issues that surround the evolution of technologies and the development of new end uses, and, therefore, the models are better able to provide, in some sense, an envelope for the forecast.

When looking at the details within the sector, we may choose not to agree with the trend projected by the econometric model. But one of the difficulties of end-use modelling, as has been probed in this hearing, is the question of the "other" category. And I referred specifically to this in my direct evidence. To have a sense of where the sector totals should end up, it is important to have models at the sector level.

Now, in the case of the commercial sector, there are good reasons why we didn't choose to run with the econometric model; but in the other sectors, we were quite happy with the results. We found that the econometric model for the residential

and industrial sector produced forecasts that were very similar, not identical, but very similar to the results from the end-use analysis.

Q. Maybe if we could move to the residential model under the EEMO analysis.

I believe it was Mr. Rogers, yesterday afternoon, who was asking you about the price of natural gas over the long term and Hydro's predictions. And those were that natural gas prices were predicted to increase relative to that of electricity.

And in Exhibit 77, you talk about, in your saturation equation, that Hydro attempted to include the price of natural gas in this equation, but that it couldn't. I wonder if you could explain for me why you couldn't use that variable in that equation.

...

[11:55 a.m.] A. I think, simply, it was not statistically significant.

Q. Does that conclusion give you some concern, given that natural gas is the chief competitor of electricity in the space heating and water heating markets, that equation cannot pick that up?

A. The saturation equation has oil in it, oil prices.

Q. Yes?

A. And strictly speaking, as has been discussed, the space heating market in Ontario is really divided between the areas where gas is available and where gas isn't available. In the areas where gas is available, electricity gets very little of the incremental market share, and where gas is not available, it competes with oil and it gets a very much larger share of the incremental market. And effectively, it is in fact in competition with oil more than it is in competition with gas.

Q. But, Mr. Burke, I understand when you say you include oil in this equation, but hasn't oil been steadily losing its market share over the past 20 years?

A. Yes, to gas, in areas where gas is available.

Q. Would it have been possible for Hydro to develop an alternate specification for its saturation equation so it could take account of natural gas prices?

A. There was an interrogatory that either asked that question of the saturation equation or the use equation, and I am not sure at this point.

It's conceivable we could have done it with gas. I'm actually much happier that we are doing it with oil. You certainly could not fit both variables into the equation at the same time; they would both be insignificant if we put both oil and gas prices into the equation. If I have to chose one, I would prefer to chose oil.

Q. Even though it's reasonable to predict that the share in the market in terms of fuels competing with electricity for the residential sector, the likelihood is that the natural gas share is going to increase, as opposed to the oil share increase in the future?

A. I think our forecast at the end-use level suggests that the natural gas share stays almost constant in the province, and that oil does lose to electricity. And effectively, while we cannot really disaggregate that, between the areas where gas is

available and where gas isn't, my intuition would be that largely that is occurring in areas where gas is not available.

Q. Now, when we are speaking of the residential sector, Exhibit 77, it indicates - and we have talked about this - that electricity prices, electricity consumption, rather, has been growing quite rapidly in that sector over the past 10 or 15 years. Would it be fair to say that two reasons for this would be decreasing appliance costs and the introduction of more efficient technologies into the marketplace, which makes appliances such as VCRs and microwave ovens more popular purchases?

A. I have to admit, Mr. Rodger, I do not understand your question. Could you rephrase it?

Q. Well, if we say that, over the sample period for the residential sector, there has been an increasing demand in the use of electricity in the home, in that there have been more appliances being purchased over that period. And a reason why people buy more appliances is that they either cost less than they did in the past, they are more accessible to the population, and that the introduction of new technologies, such as things like microwave ovens and VCRs, technologies that weren't present in the past,

these factors combine so you have an increase of appliances in the household?

A. I must admit, I have not done an analysis of the real cost of a refrigerator, for instance, which is an identical refrigerator to one ten years ago to know whether your assertion that the real costs of appliances has been falling, and whether that in itself is a factor in the continued saturation of appliances into the marketplace, these basic appliances.

The way we tend to look at it is, with rising incomes, certainly saturation rates rise, especially for some of the more discretionary appliances. And it certainly is also the case that VCRs and so on did not exist to any practical extent 10 or 15 years ago, and now do, and are becoming cheaper, so that that has contributed in a small way to the growth of the residential sector.

Q. So, there has been no analysis by Hydro on what the change in appliance prices do in the overall residential sector analysis?

A. No, that really hasn't been necessary. As you asked me to agree earlier on, we do our analysis at the aggregate level for the econometric perspective, and in that analysis it is the use of

electricity and the price of electricity and the saturation that enters in, and that's what we are modelling.

It could be that effects to do with the decreasing - if there is such a decreasing - real cost of appliances are captured through an implicit price effect. But, we do not explicitly have an effect for the changing real cost of appliances in our analysis in the econometric approach. And I think you could sense from what Dr. Buja-Bijunas has been saying, that we don't do an historical analysis of that sort, really, in the course of calibrating the end-use model.

Q. I take it, then, that if there wasn't that kind of analysis done on the change in appliance prices in the past, then the ELSAT analysis also wouldn't pick up, or deal with, changing trends in appliance prices in the future?

A. No, that's quite incorrect. That's just the opposite of what I said.

It's implicit in what we are already picking up. Saturation changes for a variety of reasons, it's proxied by the variables here. And it's, in fact, one of the benefits of econometric analysis that you don't have to be explicit about some of these factors, like technical change and real cost of

individual entities at the disaggregated level within the sector, in order that their effect be captured, either as an income effect or as a price effect.

Q. Now, if you just go back, when you said about the technological change, just in your last comment, I wonder if you could expand on that. By 'that,' I am referring to these new technologies that you were talking about.

A. I see, okay. Essentially, the econometric model picks up whatever has determined load in the past as a function of these variables. And if those forces have been something such as you were referring to, such as decreasing appliance costs, as opposed to increasing electricity prices or decreasing electricity prices, then one way or another, they are captured here and are implicitly extrapolated into the future at the same relationship they had to load in the past. To assess whether that is a valid assumption is something which judgment might be used for.

Q. Now, under the residential model, when you are analyzing the demand for energy, the consuming unit is the household. That's the unit?

A. Yes.

Q. Now, what comprises "the household," what are all the entities in that definition or in that

term?

A. Well, do you want to be very specific here? For the 1990 forecast in the residential sector, we moved to a unit of housing stock. I think that's described...

Q. I guess that was my next question. I wanted a comparison of how those two terms --

A. Okay. Would you like an explanation of why we made that transition from households to housing stock?

Q. Yes, please.

A. The reason was that, in historical data set, households are a function of demographic forecasting and growth in population and headship rates, essentially; how much people per household. That tends to have a fairly steady trend to it. But in practice, the number of housing units is quite volatile.

We experienced a situation in the late '70s and early '80s where, with high real interest rates, there was very low construction of new housing in Ontario. And then, starting about 1986 or '85, housing went through a major boom in Ontario. And from the perspective of load, it is actually when these houses come into being and their appliances and heating

systems and so on are plugged into the system that the load actually materializes on the system.

So that, one could have a demographically increasing forecast of households, which leads to a pent-up demand for houses, which is really what happened by the time we got to the mid-80s.

And it would be incorrect, really, given that the housing market got substantially out of whack with the number of households in this period, to be focusing on households, and we felt we would get much better modelling results to focus on the number of houses.

We have to make an assumption in the long run that these two markets do -- sorry, that households and housing stock are essentially moving together, that is, that in the long run vacancy rates remain at a sort of constant and acceptable level, although at individual periods in time they may be higher or lower. But, for modelling historically, the specification is improved in these equations by using actual housing stock.

Q. When we are speaking of the household as one category, in the residential model, when you are aggregating demand across households, you must have made certain assumptions about household preferences in

order to do that, in order to aggregate it to one group; is that correct?

MR. B. CAMPBELL: Do you mean housing stock preferences, household preferences?

MR. RODGER: Q. No, household preferences in terms of the appliances that each household would purchase or have in their household?

MR. BURKE: A. Well, I think the model for the residential sector is fairly well described in Exhibit 77. And the indexes we use for electricity use per household and saturation per house -- sorry, per house are not -- they are an aggregate index. They do not reflect individual household differences.

Actually, that is something that the REEPS system captures very well.

...

[12:10 p.m.] Q. So, am I correct when I say that household differences, in terms of appliance mix, that is restricted to the REEPS analysis?

A. Yes. We don't disaggregate below the sector total level in the econometric analysis. And in the end-use analysis, REEPS uses a large sample of households to work with in preparing its forecast. That is the REEPS 1.0, I should say.

Q. Now, for the commercial model, I had one question. When you were describing your model, you said that cooling degree days were tried as an explanatory variable, but inclusion of this variable distorted the other results. That is found on page 32.

And I am wondering if you could explain what results were distorted. What did you mean by that sentence?

A. I don't have the specific run with me that was done with cooling degree days, but I would imagine that the elasticity results were worsened, in some sense, by the inclusion of the cooling degree day variable.

Perhaps --

Q. If I could get that answer at some time. It doesn't have to be right now.

A. You would like to see, essentially,

what the equation looked like with cooling degree days in it?

Q. Yes.

Now, finally, turning to the industrial model, and I understand that, for that equation, you imposed a constant returns to scale in the analysis.

A. You mean in the energy equation?

Q. Yes. I wonder if you could, first of all, define what constant returns to scales is?

A. Well, constant returns to scale implies that as GDP grows, electricity -- sorry, energy - and I am giving you a specific example - energy would grow at same rate at GDP. It is directly proportional.

Q. So, one unit would produce one unit?

A. That's correct.

Q. I wonder if I could get you to turn to Interrogatory 1.24.11, please.

This, you will recall, I referred to last week; it was a report entitled, "Ontario Manufacturing Competitiveness Relative to the United States."

A. Yes, I guess I have that here.

Q. And on page 18 of that report, there is some analysis done on returns to scale, which were estimated using two different methods for major

manufacturing and for total manufacturing for the industry in Canada. And that analysis showed that in most manufacturing sectors, they did not exhibit constant returns to scale.

I am just wondering how you reconcile what this report states, in terms that you don't have constant returns to scale.

A. No. These are completely incomparable matters. I was referring to constant returns to scale in an energy equation, so that the energy factor is, what we are saying, has a constant returns to scale relationship with respect to output.

I believe - and Mr. Rothman can correct me here - but this is a kind of a total factor analysis. All that is increasing capital, labour, and energy results in a more than a one-to-one relationship to value added.

Q. But the two are --

A. So that you can't tell from this, whether it is the capital or labour factors that are increasing. Returns to scale are a constant.

Q. So, you are saying the two are entirely unrelated?

A. You can't sort them out. It is like trying to unscramble the egg, as far as I am concerned.

Q. Well, perhaps my confusion in this comes -- in Exhibit 77, would it have been better to have said that there is imposed a constant elasticity, instead of a constant returns to scale?

A. We imposed a unitary elasticity, if you would like to view it that way.

Q. Thank you.

A. And we imposed it because if we didn't impose it, we got elasticity results for other variables that were insignificant or negative, and negative own price elasticities for electricity -- sorry -- positive, positive own price when you expect negative, the opposite sign.

Q. One final -- a couple of questions. In your specification of the industrial model, you describe how there is an alternate two-stage model which was entitled, "A Linear Logic Cost Share Model."

And I gather that in this two-stage model, you first get the total energy demand; I take that as a function of output, an average price or a weighted price of the individual fuels; yet the demand is allocated among individual fuels by a cost share model.

And then, for the second stage, the optimal of cost shares of each energy type and quantity

shares are determined. But I don't understand what the link is between those two stages, how one fits into the other. I wonder if you could help me on that.

A. Well, the first stage prepares a forecast of total industrial energy demand in Ontario, given industrial GDP and the other factors, price.

And then, in order to determine what the electricity forecast -- the electricity's share of that market, will be, and hence the electricity forecasts, the second set of equations is a market share model, which functions independently of the energy model. That is, the market shares are determined amongst the fuels, in a simultaneous system for market share.

And once the market shares have been determined, they are multiplied by the energy forecast to get first the cost share and then, ultimately, the quantity share of each fuel.

I believe that is all described on page 46 of Exhibit 77.

THE CHAIRMAN: I am sorry, what page was that, you are saying?

MR. BURKE: That was page 46.

MR. RODGER: Those are all my questions. Thank you.

MR. BURKE: Thank you.

THE CHAIRMAN: Thank you.

Mr. Poch, I guess you are next. Just take your time to get organized.

MR. D. POCH: Thank you, Mr. Chairman.

Mr. Chairman, we are just distributing the various exhibits that we propose to refer to now, to try to save the commotion. Perhaps I could ask that numbers be assigned to that, but I might wait a moment until people have their copies in front of them, so they can note them at the same time.

THE CHAIRMAN: All right.

MR. D. POCH: There are, I believe, sufficient sets for those in the audience today as well, and we are just having sets provided to the Hydro witnesses and counsel.

Hydro's witnesses have had the overheads and related exhibits since yesterday since they do have some numbers embedded in them.

THE CHAIRMAN: Now, do you want to assign some numbers to this material that you have given us?

MR. D. POCH: Yes.

Are there sets in front of the witnesses yet?

MR. MARTIN: No. I am sorry. It is going to take a few moments.

MR. D. POCH: Okay. My apologies, Mr. Chairman. We had assembled sets for the Board, but we failed to have assembled sets for the panel, and they are just being collated here.

THE CHAIRMAN: Do we have some extra sets of these?

THE REGISTRAR: Yes.

THE CHAIRMAN: We have some extras over here.

MR. D. POCH: Perhaps we can start by giving those to the...

THE CHAIRMAN: We should have one for the panel and one for counsel.

MR. B. CAMPBELL: Mr. Chairman, I should just point out that in terms of what we have had, yes, we had the interrogatory list --

THE CHAIRMAN: Could put the exhibits in first, it will be a little easier to follow once we have done that.

MR. B. CAMPBELL: Yes.

MR. D. POCH: Mr. Chairman, perhaps I can suggest that the first exhibit be the one entitled, "Overhead Transparencies and Related Materials."

THE CHAIRMAN: And that will be?

THE REGISTRAR: 107.

THE CHAIRMAN: 107.

---EXHIBIT NO. 107: Exhibit entitled, "Overhead Transparencies and Related Materials."

MR. D. POCH: I don't believe it is necessary to give a number to the interrogatories or the list I will be referring to.

THE CHAIRMAN: Right.

MR. D. POCH: The next exhibit could be Samples of Ontario Hydro load building efforts in the 1940s through '60s, the thicker package.

THE REGISTRAR: 108.

---EXHIBIT NO. 108. Samples of Ontario Hydro load building efforts in the 1940s through '60s.

MR. D. POCH: Followed by samples of Ontario Hydro load building efforts in the 1970s and '80s.

THE REGISTRAR: 109.

THE CHAIRMAN: 109.

---EXHIBIT NO. 109: Samples of Ontario Hydro load building efforts in the 1970s and '80s.

MR. D. POCH: Followed by excerpts from OEB materials.

THE CHAIRMAN: 110.

THE REGISTRAR: 110.

---EXHIBIT NO. 110: Excerpts from OEB materials.

MR. D. POCH: And then excerpts from select committee materials.

THE REGISTRAR: 111.

---EXHIBIT NO. 111: Excerpts from select committee materials.

MR. D. POCH: Price elasticities, a 1987 review by Ontario Hydro.

THE REGISTRAR: 112.

---EXHIBIT NO. 112: Price elasticities, a 1987 review by Ontario Hydro.

MR. D. POCH: An Ontario Hydro end-use forecasting experience, excerpts from the 1987 presentation by Ontario Hydro.

THE REGISTRAR: 113.

MR. B. CAMPBELL: Just a minute.

What does that look like, Mr. Poch?

MR. D. POCH: It is a thin document.

THE CHAIRMAN: It is entitled, "Ontario Hydro End-Use Forecasting Experience."

MR. B. CAMPBELL: It looks like my package had two of one thing and none of this one. That is fine, I have got is sorted out now.

THE CHAIRMAN: 113.

THE REGISTRAR: 113, yes.

---EXHIBIT NO. 113: An Ontario Hydro end-use forecasting experience, excerpts from the 1987 presentation by Ontario Hydro.

MR. D. POCH: 113, thank you.

And finally, Scenario-based planning examples from Shell Oil and Southern California Edison.

THE REGISTRAR: 114.

---EXHIBIT NO. 114: Scenario-based planning examples from Shell Oil and Southern California Edison.

...

[12:26 p.m.] MR. D. POCH: Just anticipating Mr. Campbell's concern, I did give him copies of the materials which had some analysis embedded in them; and actually, before I even say that, there is one further exhibit which is a copy of the Challenge Paper of the Ontario Round Table on economy in the environment.

THE CHAIRMAN: Do you want that marked as an exhibit?

MR. D. POCH: Yes, please.

THE CHAIRMAN: That will be 115.

THE REGISTRAR: 115.

---EXHIBIT NO. 115: Ontario Round Table on Environment and Economy Challenge Paper.

MR. D. POCH: And I was able to provide Hydro's panel with the exhibit with the analysis embedded in them.

The other exhibits, Mr. Chairman, I won't be asking the witnesses to verify their content in any significant way that would require them to have analyzed them. Indeed, I imagine we won't reach most of them today, so I trust there won't be any difficulty arising out of their not being available until today.

If they are, I would simply ask --

MR. B. CAMPBELL: I have several inches of paper that clearly questions are going to be asked

upon that we have not received until today. I want it clear that the thing we received yesterday was Exhibit 107. That's it.

And if the panel is going to be expected to answer questions on this volume of material, I expect them to be -- we will have to deal with it as we go along, because they have had no opportunity to review that.

MR. D. POCH: Yes, I appreciate that and as I said, I don't anticipate the questions I will be asking will be taxing.

MR. B. CAMPBELL: Well, if they are in relation to the material, surely --

THE CHAIRMAN: Let's see how we do; let's see how we get along with it.

MR. D. POCH: Thank you, Mr. Chairman. To begin, I should just introduce my colleague to the left who is David Argue, who is an energy economist and consultant, who is acting as case manager for the Coalition of Environmental Groups.

CROSS-EXAMINATION BY MR. D. POCH:

Q. Panel, let me start by a word with respect to qualifications. I am not challenging your status as experts, but I did want to just get on the record a little bit of your experience external to

Ontario Hydro.

Mr. Rothman, you have been at Hydro for nine years?

MR. ROTHMAN: A. Yes.

Q. And your experience prior to that, was it in the load forecasting or economics sphere?

A. Economics.

Q. And, Mr. Burke, I take it you have been at Hydro for more than a decade?

MR. BURKE: A. It is about eleven years, yes.

Q. And the bulk of your load forecasting experience is with Ontario Hydro?

A. The bulk.

Q. And prior work was...

A. With the Ontario Government.

Q. And was that in load forecasting?

A. Well, the issue of the forecast of electricity demand was part of some of the work that I did for the Ontario Government.

Q. It was one of several responsibilities?

A. Yes, I worked in energy economics and energy policy for the Ontario Government in various capacities.

Q. And Dr. Buja-Bijunas, you have a doctorate, I see?

DR. BUJA-BIJUNAS: A. Yes.

Q. But it's in the nuclear field, I understand; is that right?

A. It's nuclear physics.

Q. And you have been at Hydro for about ten years?

A. That's correct.

Q. Do you have load forecasting experience outside of Hydro?

A. No, I do not.

Q. Now again, not wanting to suggest that any of you aren't experts in your field, but is it fair to say that none of you are independent experts of load forecasting?

MR. BURKE: A. I would suggest that the only true way to become a loads forecaster is to be a practitioner of it. And in that sense, I am as independent an expert in load forecasting as you are likely to find in Ontario.

Q. Well, put it this way, Mr. Burke. You would be quite aware of any desires that might exist inside the Corporation to have doubt resolved one way rather than the other?

A. I don't know what issue you are alluding to. Maybe you could be more specific?

Q. If there are any corporate realities -- I am thinking perhaps if we take the example of forecasters within particular commodity agencies in the private sector. Is it fair to say that there is often a concern that in-house forecasters can be influenced by the desire of the particular sector to appear to the world in a certain fashion?

I'm not suggesting that people are unprofessional, but that there are institutional biases in the way that the world is perceived.

A. I am prepared to state that the forecast, the load forecasts, that I am responsible for, are prepared independently and that there is no such sort of institutional override, or whatever it is that you are implying, to the forecast that is before this Board.

Q. All right. You are not bringing forward any witnesses from outside Ontario Hydro who have examined your forecasting and are prepared to give evidence on, or are being brought in to give evidence in support of that, are you?

MR. B. CAMPBELL: We are not proposing to call any additional load forecasting evidence in our

forecast validity

case, in putting in our case --

MR. D. POCH: Let's leave it, then.

MR. B. CAMPBELL: If we have to reply to, maybe it will be a completely different matter.

MR. D. POCH: Thank you.

Q. I am going to put you on a few matters of overview before we get to any of the graphics.

In assembling your load forecasts, there is a great deal of economic information, I take it, that you have gathered. We have heard about it for the last week or so.

Mr. Rothman, first of all, Mr. Burke, how many people do you have in total? I missed that comment this morning. I gather that was in cross, and I won't go on at length about it, but in your economics and load forecasting groups?

MR. ROTHMAN: A. The total division, that is, the economics and load forecasts division, has an authorized regular staff complement of 40 at the moment. We are, as is not unusual, somewhat below that right now.

Q. That's fine. I am not worried about the details of it?

A. As Mr. Burke points out, of course,

that's not all economists; that is our total staff; it includes everybody

Q. You don't make just a load forecast, or two load forecasts. It's filled with many forecasts of an economic nature. Roughly how many forecasts are embedded in, for example, the EEMO load forecast, how many economic forecasts?

MR. BURKE: A. I think one would have to just count them all up, and I can't say really offhand. The EEMO modelling system doesn't have that large a number of exogenous variables to it, but I think there is a list -- we have supplied a complete list of those variables in some interrogatory. If that's important, we can count up how many there are.

Q. We are talking in the nature of a dozen, something in that range?

A. Well, could be more than a dozen; could be a few dozen.

Q. And the LISA forecast for GDP is, in turn, an input into the EEMO, I take it, and LISA has exogenous variables--

MR. ROTHMAN: A. Yes.

Q. --which are brought in, and they are from a number of sources as well.

A. Yes. A couple of page listing of

exogenous variables.

Q. I would like to ask you then to run through the list of environmental information that's incorporated into the load forecast, the sources you rely on in your load forecast for the environmental components.

MR. BURKE: A. What environmental components are you referring to?

Q. Well, you tell me.

A. Well, I think it is a rather undefined question.

Q. Well, are there any particular modules of your forecast that are driven by a forecast for environmental regulation in particular, or you do a systematic review and you have sources you rely on, as you do for each of these economic forecasts?

A. The impact of environmental regulation, if it was to occur on the economy of Ontario, for instance, would be something that the economic forecasters would consider in preparing the economic forecast for Ontario, and I think there was some discussion last week about that. Maybe you could suggest something else.

Q. That's my problem. What I got out of last week was that you were telling me how it could go

either way and it depends what you assume, and I am wondering what you assume. I am wondering what your sources are and what your assumptions are.

A. I think Mr. Rothman is quite explicit in what he assumed. Maybe he could repeat it. Essentially, he assumed the continuation in the economic forecast of the current trends in environmental regulation, and there would not be a dramatic departure from those trends in the forecast period. Maybe he would like to confirm that.

Q. Mr. Rothman, can I ask you what your source for that -- assuming that's correct and Mr. Burke has paraphrased what you said, succinctly and correctly. Can I ask you what your sources are for that forecast?

MR. ROTHMAN: A. Let me just go back and ask, and essentially confirm, what Mr. Burke has said. We make that forecast. There are no explicit variables within the LISA model that represent environmental regulation.

But, as Mr. Burke summarized for me, our previous forecasts have assumed that whatever -- our forecast essentially assumes that whatever the previous trends have been, such regulation will continue. Whereas, that assumption essentially is our own

judgment.

Q. All right. Have you had a chance, Mr. Rothman, to consider, Mr. Burke, the suggestions made in the Ontario Round Table on the Environment and Economy Challenge paper, which is Exhibit 115.

MR. BURKE: A. I have read that paper some weeks ago--

Q. Mr. Rothman, it seems that you are the one who--

A. --some months ago, I should say.

Q. --has been responsible for incorporating environmental scenarios into the forecast. Have you had a chance to look at that?

MR. ROTHMAN: A. I have looked at it. I haven't read it through.

Q. Perhaps we could just touch on it briefly then.

Perhaps the easiest way to summarize it is just to turn to page 6 of Exhibit 115, where there are laid out six guiding principles for sustainable development. Do you have that?

A. Yes.

Q. All right. Just looking at those principles, Mr. Rothman, if we, for example, were to see a move towards the second one, Full Cost

Accounting, "Make the Pollutor Pay" as it's sometimes referred to. Try to prevent over-use and exploitation in prices to incorporate environmental and social costs and resource depletion costs. Could you give me your sense of what direction that would push your load forecast and your GDP forecast?

A. That would depend in part on a number of things. But, in general, one would expect it to reduce the GDP forecast. How much it would, would depend, at least in part, on the extent to which our trading partners adopt similar principles.

Q. And you're aware -- sorry, Mr. Rothman.

A. And as I said earlier, it depends at least in part on where the revenue - this is talking about full cost accounting - it depends at least in part on where the revenue goes. If you're raising prices, the economic impact of that pricing increase depends on what you do with the extra revenue you get.

Q. So you are not prepared to express an opinion which way that would push - you say it would push GDP down in all likelihood if it would move it. That, I would take it, would push load down.

...

[12:40 p.m.] A. It would push GDP down, in all likelihood, but without certainty. The extent to which it would, as I suggested, depends on a number of other considerations.

Q. I am not going to ask you, I am not asking you to put a number on it today, obviously. I was just looking for directional information.

My second statement, that is, generally you found that, when GDP is lowered, so is electricity demand.

A. Well, I would let Mr. Burke speak to that.

Again, it depends on how one determines what full cost is, and how one applies it to various commodities and goods. If it were to occur that electricity prices under full cost accounting were to rise by less than other inputs in the economy, it is possible that the load forecast would increase rather than decrease.

But as I said, I will let Mr. Burke speak to that, although I just did, I guess I should have...

MR. BURKE: A. I think, Mr. Poch, you are asking for sort of off-the-cuff judgments about what is a very complex matter, which probably nobody really has analyzed thoroughly and rigorously to know

what the bottom line results are. You are asking for it hypothetically. That is, if we move to this at some point in the future, what would it perhaps do, and then what would it do to load? And that would really depend on all the other things that happened along with it. Maybe this wouldn't happen in isolation.

Q. That's right. It would be part of a scenario.

A. Yes, it could be part of a broader picture. It might not be part of a broader picture.

You have asked for a partial analysis of a complex change, the likelihood of which, as Mr. Rothman said, depends a lot on how our trading partners react, which industries this applies to, does it apply universally, how is it applied to get any idea of the scale of any of these effects. I think we are really just speaking extremely hypothetically here. I wouldn't want to hazard what would be, effectively, a guess as to what would happen to the load forecast under this sort of a specific change at some point in the future.

Q. All right. If I was to ask you about the fourth one, living off the interest, they referred to it as -- and also as doing better with less. I take it your answer is going to be of the same tone?

A. I think the fact is that we have very little idea and nobody has any real idea, what the implications are of this particular sort of program.

If everybody in the world chose to adopt these principles, Ontario might find it easier than everybody else to adopt these principles. We might be better off than everybody else. Everybody might flock to Ontario to do this sort of -- to live here because, environmentally, one could meet stringent regulations here.

You don't know, until you really do a complete analysis of how this set of policies is implemented and how other people implement them.

Q. Let me ask you then, instead of dealing with their principles. The brochure they have put out looks at a number of environmental sectors and gives examples. And we could just pick a couple to get a feel for where you think they would take us.

I noticed at page 12 and 13, there is a discussion of water, and the tone of it, in fact, one of the bullets is, develop and adopt water-conserving practices and devices. And one of the specific suggestions offered is a significant reduction in per capita water consumption by 2000.

Is it fair to say that that would reduce

load, both in the pumping side of it and the filtration side of it, in the sewage end of it and in the heating component?

A. The throughput of water, if the objective is to reduce the throughput of water in the Ontario economy, that by itself might reduce the energy required to cause that throughput to take place.

However, if it is --

Q. Let me pause. The energy, generally speaking, is electricity, is it not?

A. Well, for water heating, no, it's got less than half the share of the market.

Q. Okay. For the other components we spoke of.

A. For the pumping side of it, yes.

But this sounds, on the face of it, like an efficiency improvement for the Ontario economy. We would save on all kinds of pumping equipment presumably. I don't know whether we would be so much better off for having introduced this, as opposed to the way our economy would naturally have evolved; that is, whether we would have had to sink so much money into the pollution control end, or the water quality improvement end, or whatever. We might be so much better off that other activities do better. I haven't

analyzed this. It's not clear that the implications are straightforward, simple, uni-directional and unambiguous.

Q. All right. If we look at page 28, there we have suggestions with respect to the atmosphere. In particular, it's noted, in the actions column, a number of energy suggestions: Continue to improve the efficiency of consuming products; a number are listed. Develop targets for reduction in intensity of energy use, and increase energy prices to reflect full environmental cost.

Could you tell us if there is any unambiguity in the directions of those?

MR. B. CAMPBELL: Sorry, are we speaking generally, or in relation to the electricity forecast?

MR. D. POCH: I am speaking with respect to electricity.

MR. B. CAMPBELL: Thank you.

MR. BURKE: I think it's an extremely complicated analysis and I haven't done it.

I think there are very many factors going on here and there are some actions that other people might like to add to this list, if they were focusing on the atmosphere, that are not.

MR. D. POCH: Q. So Mr. Burke, you are

saying you haven't tried to analyze these suggestions, which have been agreed by at least one group of people to be components of this sustainable development future that people are speaking of?

MR. BURKE: A. It's also my understanding, Mr. Poch, that they have not analyzed them either. They are just starting to analyze them.

These are ideas that are being put out for people to think about, and I believe this document was prepared last fall and is a conceptual document. I think it is a bit premature to have the answers to every one of the issues that are contained in it.

MR. ROTHMAN: A. Just to quote one of these actions listed on page 28. It says:

"Increasing energy prices to reflect their full environmental cost in a matter that is sensitive to maintaining the competitiveness of industry in the province."

That, it seems to me, is a difficult statement to analyze in terms of its potential impact on electricity sales.

Since it speaks of all energy prices, it speaks of full environmental cost. I don't know that anyone knows what that is. It speaks of being

sensitive to maintaining the competitiveness of industry in the province, which would imply that one might not move to full environmental costs were there to be competitive considerations that might prevent that.

Q. That might temper that move.

A. That might temper that move.

So that, even this one action leaves so unclear a result that it is very difficult to analyze. And I meant to point out, as I said, energy prices not just electricity prices. So, you simply don't know how one might analyze just that one action. And as Mr. Burke suggests, there is not one action that's suggested here but a complex variety of very many actions.

Q. We would have to look at things such as cross-price elasticity.

MR. BURKE: A. Certainly you would have to look at the price range, as I mentioned in my direct, that the change to fossil-fuel prices had -- that was imposed on fossil-fuel prices.

I would point out that the very first option, reducing our dependence on fossil fuels and increasing our use of renewable energy resources, there is another option which is being considered by this

Board which is nuclear power. And in that context, it's not clear that yet - at least I don't believe the decisions have been made - that the effect of a relative price shift would not be in switching from fossil sources to non-fossil sources to include that one. And market share of electricity might rise considerably, depending on how the policy decisions eventually turn out. It's a bit premature.

Q. Mr. Burke, we will come back in a moment to what you have assumed for relative environmental niceness of the options in setting your forecast, as much as I am tempted to take you up on it now.

I really can sum up this with one question. Are you suggesting that sustainable development is just as likely to raise as it would lower demand for electricity?

A. I think what we are suggesting is that we don't know the answer to the question. Because we don't know exactly what sustainable development consists of, what will be implemented when, how our implementation will relate to how other people implement this sort of set of policies, I don't think we can say what the answer is.

It's not a yes/no, it's in the middle,

indeterminant at this point.

Q. Mr. Rothman, do you agree that you couldn't put a general direction on it in net?

MR. ROTHMAN: A. I said in my direct evidence that were sustainable development to result in a significant break from past trends - and tightness of regulation is one way to say it - that would be likely to have a negative impact on economic growth. And I would agree with Mr. Burke, that we haven't yet clear enough definition of what sustainable development might be to know further than that, in particular about electricity load.

Q. You don't see a move to sustainable development, then, reversing your exponential growth trend for, say, GDP to start with?

A. We don't have an exponential growth trend for GDP.

Q. Why don't we turn up the first graphic which is in Exhibit 107? Now, this is at page 1 of that exhibit, and it is entitled "Historical and Projected Growth in Ontario's Economy, 1947 to 2065." As you can see, we have simply graphed the projection in the balance of power, that underlies the balance of power for GDP. We have extended it beyond 2010, at the rate that you had in the 2000 to 2010 period, which at

that time was 2.3 per cent per annum.

Before I ask you about the numbers, we have superimposed a quote that you gave us, which is that the majority of modern economists believe that the economy is self-correcting; that diversions - if I can paraphrase - diversions from the long run growth tend will not persist and that you will trend toward some medium growth rate over the long term.

First of all, I take it, you don't have any trouble with that quote, since you provided it. Mr. Burke?

MR. BURKE: A. No, Mr. Rothman.

Q. Mr. Rothman?

MR. ROTHMAN: A. No. I think it is important to know that we talk about a long run growth path, not about necessarily a compound growth rate that extends indefinitely.

Q. Just looking at this extrapolation of what was in the balance of power, if we were to draw a line vertically from 1991, up to the line and over to the axis, and do the same at the middle of the next century as we have done in the overhead, this would project roughly a quadrupling of the size of the economy by the middle of the next century?

A. Is this the right time, Mr. Poch, to

disagree with the entire methodology of your chart, or shall I just agree that, given the methodology of your chart, that's the way your numbers work?

Q. All right. You will agree with that, and now you can dispute the methodology. Please go ahead.

A. What you have done is to project an exponential growth rate out 40 years, more like 50 years, beyond our current forecast. If you actually look at our forecast, what you will find is a decaying exponential, if you want to think of it that way.

If you actually took a ruler or a straight edge, and put it along the actual period of our forecast, the 25 years of our forecast as shown here, you would find that it is pretty close to a straight line in the GDP forecast.

...

[12:57 p.m.] If you look at the preceding 40 years, you get an exponential trend from about 1947 up to sometime in the mid-60s, then something not too far from linear with the recession that is quite visible in 1981, '82, and then our forecast which is pretty close to linear.

And, of course, if you take your ruler and a straight edge and run it along that linear slope through the forecast period, you come to a much lower level than is shown here.

So, all I am suggesting is that what you have done here is to infer that I have some buy-in to a forecast that projects our final growth rate expressed as a compound growth rate over the last five years; that I have some buy-in to a forecast that projects it out 50 years.

I have no such buy-in. We don't forecast like that. We express our forecast in terms of five-year compound growth rates because that is a way that is convenient and well understood. But, we don't think of our forecast as one that inherently produces an exponential growth pattern.

We think of our forecast as one which, you know, as a trend forecast. But, in order to discern that underlying trend, you have to look at the

patterns that create it. We have done no such looks at the period for which you have done this projection and so, I really can't buy into this exponential growth pattern here, at all.

MR. BURKE: A. I would like just like to add something, Mr. Poch.

Q. I will let you do that in a minute, Mr. Burke. I just wanted to ask Mr. Rothman just coming off of his answer: What do you think that long-term median growth rate, that you speak of in Exhibit 1.14.24, is then?

MR. ROTHMAN: A. Beyond 2015?

Q. Over the long haul.

A. Oh, I don't know that there is a long-term compound growth rate that will run at the same compound growth level for 50 years.

I have just said, if you look at our actual forecast, what you have got is a decaying exponential which is much more like a linear growth pattern than a --

Q. Are you disavowing that quote then?

A. No. It says, divert from its long-run growth path will only have a temporary effect. Path does not imply a compound growth rate. Most economists do not expect the economy to stray too far

from the median growth rate on average over the long term. But when we talk about median growth rate we are talking, as I said, about the median growth rate that arises from the kinds of considerations that we have given.

MR. BURKE: A. Well, no. This is the point that I wanted to give, and I think you have really misinterpreted this and quoted it out of context. This was given in response to an interrogatory that asked about the self-correcting nature of the economy. And what the response says is, that you don't expect the deviations from whatever median growth rate to last very long. It says nothing about what the median growth rate is.

I think you have inferred it to mean that there is some average median growth rate which persists into the long term, which is totally out of the context of the question and misrepresents the answer here.

Q. But you have already told us - and this will be my last question before lunch - you have already told us that your whole LISA forecast, your whole GDP forecast is premised on the notion that the economy will - I don't know your exact phrasing - perform to its capability.

MR. ROTHMAN: A. To its potential.

Q. All right.

A. But, this doesn't speak to what you do to -- to how you arrive at a forecast of that potential.

MR. D. POCH: All right. Let's come back to that after the lunch break then, if I may.

THE CHAIRMAN: We will adjourn until 2:30.

THE REGISTRAR: This hearing will adjourn until 2:30 p.m.

---Luncheon recess at 1:01 p.m.

---On resuming at 2:31 p.m.

THE REGISTRAR: This hearing is again in session. Please be seated.

THE CHAIRMAN: Mr. Poch?

MR. D. POCH: Thank you.

Q. Mr. Burke, you were concerned that we may have used the quote about modern economists thinking there is going to be a long-term growth path, out of context. Do you have a view - and, Mr. Rothman, I could ask this to you as well - about what the view is on long-term, quite long-term, GDP? Is there a more applicable quote we could pencil in?

MR. BURKE: A. As I recall, Mr. Rothman has already said we have not analyzed GDP growth beyond

2015, but I will leave him to confirm that.

MR. ROTHMAN: A. I would say that the --

Just to reinforce what Mr. Burke said towards the end of this morning, which is that this quote is not about where the path lies, but rather about whether the economy is likely to deviate in the long run from it very much.

Q. I appreciate that, and I understand your point, and now I am just wondering about where the path lies.

A. And the answer to that is, as Mr. Burke says, we really haven't looked at that question. I think if we were to do so, we would look at the same kinds of factors that we have for the period up until 2015. And those are essentially the same driving factors of productivity growth and population growth, labour force growth.

Q. And if you wanted to take a long-term perspective, it would be incumbent upon you to make some intelligent guesses about how sustainable developments in errors are going to come into play in that timeframe, wouldn't you?

A. I would think that we would, in making those productivity assumptions, try to understand what the structure of the Ontario economy

might be, but I would be hard put to say what sources of information you might use about how we would look at that structure.

Q. Okay. Earlier, you mentioned that you didn't accept this extrapolation we had done of your earlier GDP projection, and you indicated that it was a decaying rate. So, if I understand that correctly then, you foresee continued positive compounding growth, but that the annual rate of that growth is declining over time.

A. No. I only -- not beyond 2015.

I only pointed out that our forecast up to that point is of that nature.

Q. All right. That is fair.

And you have also projected, at least, a gradual decay, as it were, in the relationship between electricity and GDP; that is, that the intensity number is -- perhaps 'decay' is the wrong word - but the intensity number is improving. We are seeing a little more efficient energy use.

MR. BURKE: A. That's correct. I think I would just like to add something to what Mr. Rothman said and it is something that I actually said last week as well. I am just reminding you that the long-term fundamentals were driven by demographics in

productivity and that a major element of that, the demographic forecast, is one that is subject to policy determination. And I am not sure that productivity growth in itself is a bad thing.

So, some of the trends are determined by some of the policy choices that we make down the road.

Q. I understand that. We will come back to explore that. I just wanted then to turn to the second page of Exhibit 107.

We had anticipated that your position is that the rate of growth is decaying. And what this graph does is it is a regression of the trend in the decay within your forecast, for that rate, and we have projected that decay to continue outwards.

Are you familiar with the approach, Mr. Burke, a power regression or a logarithmic regression?

A. Is this against the log of time or something like that?

Q. Yes, I think that's right.

A. I am. I guess if you had asked me how, I would try to extend my forecast from 2015 to 2050 without -- just doing it in a very simple-minded sort of way, I think I would have tried to see - but I must admit that I never tried this, so, I don't know what the result would be - what the result of that

single-equation model that we use for the uncertainty process, what that would yield.

And effectively, that model suggests that, as the economy grows, the relationship of load to GDP declines, and I am not sure whether --

Q. This is consistent with that, I take it?

A. Well, I don't know whether it is as steep as -- I mean, it could be that we might have even steeper descent. I don't know.

MR. ROTHMAN: A. Did you use as the estimation period for this regression only the forecast period? Or did you include some of the actual historical period in this regression?

Q. I think what we have done there is taken the -- you can see the single line, 1990 forecast rates -- that is your numbers and we have simply done a regression on those numbers.

MR. BURKE: A. Well, I think Mr. Rothman is making a good point; I think it probably would have been a lot more appropriate to, like your previous one, start it at 1947, or something like that, and run the whole thing through.

Q. All right. If you have a decaying rate, but that is nevertheless compounding and growing

because of growth generally, you are going to reach an equilibrium at some point; is that fair?

It is going to approach an asymptote. It is an asymptote approaching a limit. The simple math of the situation is that, is it not?

MR. ROTHMAN: A. If it is decaying positive growth, the limit is zero.

Q. All right. And then it is going to just be driven by the --

MR. BURKE: A. I am not sure I follow what you are getting at here.

Clearly, there are drivers to this system that lie outside the system, and population growth is one of them. If population growth decays in some sense, then maybe the rest of the system decays with it.

But, you know, if immigration into Ontario drives population at a 3 per cent growth rate, you are not going to have --

Q. Mr. Burke, I am not asking you to make a long-term post 2015 projection. All I am asking for is to acknowledge that, if the trend in your forecast is extrapolated, taking into account this decaying rate, this is the kind of line you get. I am not asking you to agree that it will continue.

A. Well, I don't know where it stops, though; I mean, asymptotically to what? You know, I mean, it --

MR. ROTHMAN: A. Well, I said asymptotically to zero, if you constrain it to be positive, but there is nothing that constrains it to be positive. That is, as Mr. Burke suggested, if he were to run his single-equation model out, what would drive that would be a GDP forecast, in effect; which would be, in turn, driven by a population forecast.

And as we have already noted, the fertility rate that is in our forecast would, by that point, be producing negative population growth in Ontario.

By 2015, the baby boom generation, which is that bulge that has been running through the population 'H' structure, would be into the high mortality rate years. And without immigration, you would certainly be getting negative population growth rates in Ontario and, in consequence, the potential for negative rates of real growth.

I am just saying, it is a possibility. Those are the kinds of things we simply haven't looked at yet, but--

Q. I appreciate that.

A. --all I am suggesting is that this kind of speculation, you are putting some kind of funny constraints in the way that you are doing it.

Q. We are just trying to see where your forecast was headed, if the trends in your forecast -- or in the trend of trends continues.

And you are telling me there is no reason to assume that the trends in your forecast will persist; is that fair?

A. Yes, that is fair.

Q. Okay. So, you would take a vertical line at 2015 and put it through that graphic and say, beyond that, you don't know where that line is going to go?

A. We don't, at this point. I think it is also fair to say that if we were to make such a forecast, we wouldn't be forecasting that at 2015. Something magical happens and we have some radical break with what the trends had been up to 2015.

But to suggest that whatever trend had been occurring before 2015 is what we would then find is, I think, going further than we could do at this point.

Q. So if we turn up the third page of this exhibit, Exhibit 107, what we did there was simply

take that line that was generated by the power regression, and use it to project electricity use, and that's the bottom line in that graphic.

And the top one is just what the annual increment is.

...

[2:42 p.m.] Again, you aren't prepared to say that beyond 2015, it would continue in the way we have shown it here.

MR. BURKE: A. No.

MR. ROTHMAN: A. No, I am not.

MR. BURKE: A. Electricity use, no.

Q. Okay.

Gentlemen, I would like to -- and Doctor, excuse me, I would like to look at the relationships between forecasting and system planning somewhat. If you could look at page 4 of Exhibit 107, we have somewhat simplified the schematic of the planning framework to facilitate our discussion here.

And first of all, do you understand what we have got here on the right side of the two arrows pointing at each other? We have your basic load forecast, and you deduct DSM, which is incentive demand-side measures and you deduct NUGs, and we understand that you technically split that one and put some in supply and some in demand. But that gets you to your primary load.

And on the other side, we have existing, which is presumably decaying, plus new to get the future capacity, less reserve margin. And the object of the game is get those two balls in the middle to

line up.

MR. ROTHMAN: A. And you have, of course, left out NUGs from the left-hand side of this diagram.

Q. That's right. To be perfectly correct, then, NUGs on the right should be load-displacing NUGs, and there should be another part of NUGs on the left in the new supply, which is the NUGs that supply power to the grid.

A. Yes, that's right.

Q. And so, if we go to the fifth page, if we wanted to see simplistically how you could respond to a change in the basic load, one option - and we can have mixes of option - is to increase these two measures on the demand side, if you will.

And the other option appears on slide 6, and that's to increase the supply option. And that way you can maintain this balance. And you can do mixes of the two. So, it's the basic load that's driving, it's the foundation of that planning exercise.

MR. BURKE: A. It is the largest single factor, but I think, as is pointed out in the report, the decline in output or ability to use the existing system is also an element in the requirements, and what moves the left-hand side of the picture down, if you

don't do anything about it.

Q. All right. Now, if we go to the seventh page of that exhibit, we have tried to break apart the components that go into the basic forecast of electricity use, and let's just go through it to make sure we have a comparable understanding.

In fact, we will go through it backwards. We will start with human activity. This would be analagous to your forecast of GDP and productivity and sectoral make-up?

A. Are you asking me whether that's the way you have defined the term? Sorry?

Q. I just want to make sure you understand what we have done here and we are replacing things and...

A. Sure, okay.

Q. That results in a need we could even -- to take an end-use analogy, we could say the human activity is housing, the energy service requirement that spills out is heating, and then there is a fuel choice to be made. That could be made by the case of heating gas or electricity, and you have to forecast how that is going to be made too.

And then, once you have got the fuel and you have got the end-use task or service to be

provided, there is a question of how it will do it. And in the heating analogy, it might be baseboard heaters, it might be heat pump, it might be a more or less efficient appliance, and you have to forecast that as well, at least in the end use --

A. I want to go back -- maybe that's what -- go ahead.

DR. BUJA-BIJUNAS: A. That's quite correct. I am not sure if you skipped over it or if you had additional comments.

Where you have on your intensity, you have that synonymous with efficiency of use and natural conservation. I think I am a bit more comfortable with your use of the word "intensity" than with "efficiency," since intensity incorporates two considerations; efficiency in a very technical engineering sense, and utilization or usage requirements service level demands, that are another consideration, which, put together, give you intensity. So, intensity is not necessarily synonymous with efficiency.

Q. We could also put utilization, say, in the human activity category, could we not, the --

A. Except we normally define human activity, as you said households, for example, that's

the number of households, not the fact that households require larger refrigerators.

Q. Good.

MR. BURKE: A. I would like to push that point just a little bit, just in case you want to use this paradigm too much more.

Energy service, the circle area here, is really where we capture utilization. It's the translation of the household into the amount of heating that a particular household, as its income rises, for instance, may require. And when we look at intensity, it is the combination of efficiency and utilization, so that we would not subscribe to your particular disaggregation or categorization of the terms here. It does not reflect the way we think an appropriate analysis would be decomposed.

And I think it is important because the confusion of intensity changes with efficiency changes can lead to some very incorrect conclusions, and it's a matter that we have been emphasizing throughout our presentation so far: that it's important to keep these things clear and not sort of smudge them together which is what this overhead does.

Q. Fair enough. So quite clearly you prefer the word "intensity" rather than "efficiency" so

that you capture explicitly, and quite apart from where it appears on the graphic, you want to be sure that we capture explicitly this question of utilization?

A. Utilization and efficiency should be aligned with intensity. It shouldn't just disappear somewhere in this overhead.

Q. Let's look at the way you very, very schematically -- let's look at the way you do this forecasting, the two modes we have heard so much about, the econometric and the end use.

The econometric, first of all. I guess that's you, Mr. Burke. You actually create a formula or set of formulas which relate variables that are considered drivers to dependent variables, and dependent are variables that the model is predicting, either as final output or as intermediate output. Is that fair?

A. That's a way to describe it, yes.

Q. The relationships of the variables are what you have referred to as co-efficients.

A. The relationship between the explanatory variables and the dependent variable, yes.

Q. Is a co-efficient.

And the co-efficients are the things you in a sense generate through these statistical

regressions of history?

A. That's correct.

Q. And there is uncertainty about each of those?

A. That's correct.

Q. And there is uncertainty about the inputs themselves?

A. That's correct.

Q. And indeed your model changes over time?

A. What do you mean? Each year when we re-estimate the model, the model is different or in the forecast period somehow the model changes? Because if it is the latter, that is not correct.

Q. Well, I was actually looking at Exhibit 1.7.35, which is, I believe, in the package we handed out.

A. Okay, yes.

Q. Excuse me.

A. I think maybe I can make it quicker for you, Mr. Poch. That controversy refers to how models change from year to year as opposed to somehow in the forecast the model changes.

Q. I'm sorry, say that again.

A. What is referred to in this

interrogatory is how the model itself changes with the addition of new information; that is, in successive years, as we re-estimate and re-specify each of the model types, the model changes. I thought you implied somehow that in any given year, somehow in forecasting the model changed over time?

Q. No, no, I didn't mean to imply that. Between years. In fact, I am looking at the quote in Exhibit 1.7.35 on the third page. This is an exhibit that compares the '88, '89 and '90 load forecasts, and you summarize how certain changes could be attributable to the change in GDP, you have made your forecast for GDP over that period, but you conclude:

> "Thus, model changes in judgment in the use of the model results account for the vast majority of the change in forecast."

A. Sounds familiar. Exactly where is that?

Q. It's in the first paragraph of text following the first set of tables.

A. Yes, okay.

Q. That's all I was referring to.

In fact, the basic load forecast is the combination of the output of this econometric

regression-driven approach with the end-use forecast, and you have explained in what degree you were relying on those and I won't ask you to do it again.

So, if we look at the end-use forecast, is it fair to describe it as a more disaggregated forecast of each industry or use, or an indicator like floor space within industry or a physical product. And then you then project that based on current use and trends and inject judgment again?

DR. BUJA-BIJUNAS: A. That's correct.

Q. Now in contrast to both of those which are forecasting based on greater or lesser degrees of history, the 2,000 megawatt that we see in the - we will get to in Panel 4 - for DSM, 2,000 megawatts in the year 2000 for DSM. And that's the -- I know the number is actually 3,000 and 1,000 of load shifting, leaving 2,000. That's not based on an econometric formula; is it?

MR. BURKE: A. It's not based on an econometric formula, no.

Q. Is it fair to say that that's a prediction of program capability based on an end-use inventory, but that the analysis is more of program capability to obtain certain penetration rates?

...

[2:57 p.m.] A. I think it is quite clearly laid out in Exhibit 9, the process that's used to determine the efficiency improvement numbers as a combination of an analysis of the potential for efficiency improvement, which is developed on an end-use basis, and the forecast of penetration rates for program types or the success rate.

Q. You have not looked at history to see what penetration rates are and done a trend analysis and projected it outwards?

A. Absolutely. We don't have a whole lot of history to look at.

Q. This a new ball game.

A. Yes.

Q. Fair enough. So, when we get to that kind of planning, it's not really so much a forecasting exercise as an analysis exercise, if you will, if you can grasp my distinction, forecasting involving some projection as opposed to --

A. Every forecast has its analysis component, and ultimately when you make a forecast you have to adopt a piece of analysis. And so we have done our analysis and then we decided, okay, is the result of our analysis something that we think is going to happen or isn't it. And to the extent that the numbers

that are in the primarily load forecast are what we think will be the outcome considering our analysis.

Q. I am trying to draw the distinction between what is principally a forecast, where I am not disagreeing it involves disagrees analysis, but the basic driver is, where are we today, how did we get here, is it this going to continue the same way or is the trend going to change a bit. And then projecting on that basis versus the in 2000 which is much more of a look at, well, what is possible, what has been tried elsewhere, certainly there is a projects of end-use in it, but --

A. There is distinction, I am not sure yet you have made it very clear what it is, but there is a distinction.

Q. It's a question of emphasis.

A. It could be.

Q. Let me harken back to your discussion about what drives electricity then. If we wanted to consciously plan to change the relationship between, say, ever, population growth and growth in electricity demand, we would want to look at what the tools available are, as opposed to simply project the status quo with some trends imposed and some judgment as to how it might, on its own, change. These are two very

different exercises, one is a hands-off, let's take our best shot at figuring out where things are going, and the other is, what the tools if we wanted to go to get in there and change it.

Do you understand that distinction?

A. I understand the distinction but I am not sure of the context in which you are applying it, because we have specifically said that what we are talking about here is the basic load forecast. The basic load forecast is not about the things that people might do to get out their tool kit and change the way things go. It is about what will happen if we see how things evolve as we have any reasonable way to anticipate how they will evolve.

Q. Just so you will know where I am headed. It's certainly our thesis - and my questions will pursue this - that the basic is, to some considerable extent, about such choices. They may be the government's as opposed to yours; indeed some of them are yours.

You are not suggesting to me, are you, Mr. Burke, that all of the choice that Hydro can exercise is in that DSM box. Certainly Hydro influences the basic, does it not?

A. The only effect that Hydro has on the

basic comes through the price of electricity itself.

Q. Okay, we will come back to that, have now fear.

Let's look then for a moment, just the kind of choses that get made not by Hydro but, for example, by the government. There would be things like housing policy, that would influence the basic?

A. Yes, I suppose.

Q. Commercial building codes could?

A. Yes.

Q. Industrial policy?

A. Yes.

Q. Even questions about urban form?

A. Certainly.

Q. And these aren't susceptible to prediction like other exogenous variables.

A. Well, no.

Q. And you have even granted me that population and thus GDP can be explicitly affected by choices about policy, policy choices.

A. Yes.

Q. Now, you have mentioned that price is something that Hydro retains some control over, we could, I am sure, get into a discussion to what extent Hydro has any control over it, but that's one way that

Hydro influences the basic, you have just mentioned that.

A. One minute, I would say, just to be clear, it doesn't mean that Hydro goes about trying to influence the basic.

The rules for setting price are clear in the Power Corporation Act, and so all I am really saying is that Hydro's actions, if they happen to result in a price change, then do impact on the basic load forecast.

Q. Mr. Burke, I am not going to ask you for a legal opinion on what the Power Corporation Act allows. But let me posit that there is some freedom in the Power Corporation Act, and let me just ask you to accept that as a jumping-off for discussion, and I am not asking you to confirm that you agree with that and I am not asking your counsel to agree with that.

MR. B. CAMPBELL: As a hypothetical, that's right.

MR. D. POCH: Q. As a hypothetical. Assuming there is some flexibility there, then Hydro could choose to use price as a way of influencing basic?

MR. BURKE: A. Yes, as a hypothetical it could.

Q. And certainly Hydro does choose to use rate structure to influence the basic, don't they?

A. I think when we change our rate structure we go to forums like the Ontario Energy Board to discuss them.

Q. I am not suggesting you don't consult; I am just suggesting that you, in fact, do use rate structure to change the basic, time-of-use rates.

A. Yes.

Q. Time-of-use you now have moved to the DSM; is that right?

A. Pardon me?

Q. Time-of-use you actually caption in the DSM, to be fair.

A. That is fair.

Q. But rate structure can affect the basic, can it not?

A. Well...

Q. We have a declining bloc rate structure, for example, for big industry right now, do we not?

A. Yes, we have a declining bloc rate structure.

Q. If we had an inclining bloc structure, that would affect their pattern of use if

not their level?

A. It could.

Q. And you could design such a structure which would be revenue-neutral?

A. But it might not be cost-related and therefore it would not be in keeping with the Power Corporation Act.

Q. Depending on what you view the costs are that can be recognized by the Power Corporation Act.

A. Yes. But all we are trying to do at this point is recover costs as so defined.

Q. Mr. Burke, hasn't Hydro in the past been used explicitly as an influence, as a factor, as a tool for economic and social development in the province? Do you remember the BILD Program?

A. I remember the BILD Program. What did you infer happened in the BILD Program?

Q. Well, Mr. Rothman, do you remember the BILD Program?

MR. ROTHMAN: A. I remember the BILD Program.

Q. Do you remember that part of the BILD Program was that Hydro changed its rate of spending on capital construction, I think it was Darlington in

fact. That was a significant component of the BILD Program, was it not?

A. Yes. At times in the past the provincial government has given various instructions to Ontario Hydro and Ontario Hydro has followed those instructions.

Q. I wouldn't suggest otherwise.

Now, isn't there another large way that Hydro has -- another tool that Hydro has to influence the basic, Mr. Burke, and wouldn't that be the marketing capability of the organization?

I am not talking about incentives which are captured in DSM. I am talking about the basic here. You do do marketing, and have done marketing which has affected where the basic is today.

MR. BURKE: A. I, in my direct, made a distinction that we now make in our current load forecast between broadly-based information programs, the impact of which we have almost no ability to measure and more specific programs that provide information that is customized and we now include under the DSM component audits and such like.

Q. Let me just interrupt you for a moment. You have just told me, if I understand you correctly, is when you do customize, that is

customer-specific audits and you feel you are in a better position to quantify it so you have moved that into the DSM box.

A. Correct.

Q. But going back to my question, and maybe recasting my question, historically Hydro has engaged in marketing and that has affected where the basic is today.

A. I suppose, if you think it was effective.

Q. Okay. Well, we ask Mr. McCarthy or somebody if he thinks his programs on spending were effective.

Hydro has engaged in research and development in aid of particular technologies, electrotechnologies; is that not correct?

A. I believe that's correct, yes.

Q. All right. Now, just harkening back for a moment to the question of things that others can do like the government. Dr. Buja-Bijunas, you mentioned the recent policy with respect to choice of appliance for heating social housing.

DR. BUJA-BIJUNAS: A. That's correct, yes.

Q. It is a very direct impact, is it

not?

A. Yes, insofar as low income housing cannot choose electric baseboards as a space heating option if it is publicly-subsidized, that's right.

Q. Now, in your forecasts have you assumed any significant moves by the government in that regard?

A. We haven't incorporated the impact of subsidized housing.

Q. I understood you hadn't captured that one yet.

A. No. We just became aware enough to be able to start quantifying it, quite recently, so it was not captured in the 1990 forecast. However, when it came to other standards regarding dishwashers or refrigerators, et cetera, we have incorporated them to the extent that they are concrete enough to make some sort of specification.

Q. We will come to that one, you have listed them before, there is about a half dozen appliance-specific standards.

A. That's right.

Q. What I am asking is a more, shall we say, dramatic move by the government on a question of, for example, electricity heating?

MR. BURKE: A. Yes, I think you may be talking about something that sometimes is known as appropriate fuel choice or something like that. And as far as I know, the government is formulating a policy in this area. I have no idea what it will contain, how strong it will be, where it will lead, but I make no bones about it. It is not in our forecast, but that is the way fuel shares will be determined in the long-term. And if the government chooses to make it stand in a way that we can be confident that it will, in fact, continue as a long-term policy, we should take it into account at that time.

Q. All right. And there are other parties or large parties, of course, all of us have some say in where electricity use is going to be by our own actions, but there are some large parties like some of the parties before this Board. I'm thinking of MEA and AMPCO, who can and have in the past assisted you or taken positions that can encourage or discourage efficiency or rate structure change and thus play a role in -- have a choice, express and indeed make a choice that affects the basic. I am thinking, the concrete example of course is when, you may recall, when AMPCO and MEA, I guess and others, made an agreement for a rate moratorium, a rate structure

change moratorium during a large part of the '80s. Do you recall that?

A. Well, you have raised several issues at once here. But dealing with the last one first, I don't believe it was simply issues related to large users that lead to the rate moratorium. My recollection is that that there were several other factors involved, one of which was concerns by people in the north and another was that we were in a recession at the time, but --

Q. Was there not a formal agreement between Hydro and MEA and AMPCO?

A. My understanding, but I stand to be corrected and perhaps there are other witnesses later on who can speak better to this, but my understanding was that the proposal that was placed before the Ontario Energy Board was an agreement between those parties.

But I would like to add, Mr. Poch, to the first part that you talked about, about the role of interest groups in affecting outcomes, I think you underestimate the role of groups like yourself as a counter-balance to these major groups. I would like to think of this as somewhat of a dialectic that goes on in the province with certain groups pushing for high

numbers and certain groups pushing for low numbers, and I think that you have some influence, too.

Q. Mr. Burke, are you saying that the MEA isn't just absolutely neutral? Don't answer the question.

Thank you, Mr. Burke, for that note of encouragement. But, specifically, if you look at Exhibit 110, excerpts from OEB materials, and if you just turn up page 7.

...

[3:13 p.m.] This is an excerpt from the Report of the Energy Board, their 1984 HR14 hearings which would have been - have I got the years right - with respect to 1985 rates?

And at paragraph 10.73, it says:

"Before turning to the specific rates themselves, we comment that the study being conducted by Hydro at the moment in relation to demand/supply options" --

now, that is the precursor to the balance of power, I take it?

A. It was a preliminary document.

Q. Yes. And the quote continues:

-- "is impaired by the moratorium on rate structure and the inability of Hydro to implement time-of-use rates."

So, that agreement was something that the OEB wasn't particularly happy with but felt they had to live with; isn't that the case?

MR. B. CAMPBELL: Just a minute. Just a minute. I don't believe Mr. Burke can possibly be expected to be familiar with the set of circumstances that existed back in 1984, excerpts of which are taken here.

MR. D. POCH: Well, I can shorten this,

Mr. Campbell --

THE CHAIRMAN: Just a moment.

MR. D. POCH: I am content to leave it, let the record speak.

THE CHAIRMAN: Let Mr. Campbell have his say, please.

MR. B. CAMPBELL: I think it is quite unfair and I don't think Mr. Burke is in a position, either because of his position then or in the intervening years, to comment in a way that is material and helpful to the panel on all of this material; specific quotes from Ontario Energy Board reports without any background as to the development of those issues.

I notice that later on in the same package, we are even getting into transcript excerpts presumably in some of these areas. I don't know precisely where they are from, but I think it is quite unfair to put Mr. Burke in this position to try and comment on such on excerpts of what was a voluminous record, I have no doubt.

THE CHAIRMAN: Mr. Poch?

MR. D. POCH: Well, if Mr. Burke feels he can't comment, that is fine.

THE CHAIRMAN: Well, I wasn't quite sure

when you gave this as a report of the Board, but it didn't say when it was and who was making it and so on. I think, at least, there should be some identification of what it is you are asking him about.

MR. D. POCH: Sorry, Mr. Chairman. It is somewhat illegible, but on page 1 - and I maybe should point this out - we have noted on there just so we didn't -- it says, report of the Board, and the section on marketing and this is from the OEB's HR14 Report, Volume 1. And if that wasn't clear, I apologize.

THE CHAIRMAN: Perhaps I am not as familiar as I should be with the way the OEB identifies its material, but that wouldn't mean very much to me. That is all I have to say.

MR. D. POCH: All right. I will be more careful in the future, Mr. Chairman.

Q. All right. Mr. Burke, I take it from this discussion that you are not in a position to comment.

MR. BURKE: A. You are quite right.

Q. All right.

THE CHAIRMAN: We really are dealing here with forecasting and I think that now there has been a slight interruption, some of these questions really don't pertain to forecasting, but...

MR. D. POCH: Mr. Chairman, if I might, what I am trying to elucidate here is there are a number of choices which can be made, have been made in the past, which influence the basic load forecast.

Now, the way Hydro has broken their case up into this notion of a basic and a DSM, there are a number of these decision points which have been lumped in with the basic. And our concern is that we are brushing past them here. To the extent that they aren't being captured by the end-use or the EEMO model; and that we get to Panel 4, when we get to DSM, we are not going to be able to talk about what the assumption is with respect to government policy or other players.

So I will --

THE CHAIRMAN: Well, I think from the context of forecasting, you can ask him anything you like about what assumptions they made and what coefficients they used and what other data and how they handled that data. I don't have any difficulty with that.

It just seems that some of the questions, at least, were trailing into another area which perhaps these particular witnesses don't have the responsibility for. But, of course, if they are prepared to answer the question, that is up to them.

MR. D. POCH: All right. Thank you, Mr. Chairman.

Q. Perhaps then we should turn to, first of all, slide No. 8, page No. 8 of Exhibit 107.

Now, with your caveat, Mr. Burke, we have simply combined the previous diagrams here to show how this feeds in.

I take it you don't have a problem with that.

MR. BURKE: A. Except with my caveat, which is a major caveat.

Q. All right. Okay.

A. Will you recast these at some point to reflect our views?

Q. Your concern has been expressed and it is on the record. I don't have any problem with your concern at all, Mr. Burke.

Turning then to the following page - the only difference being some dotted lines - just to indicate what we are looking at in the scheme of things. I would like to discuss some of the links between some of the feedbacks and interactions between the different parts of the basic load, the basic forecast, and what goes on later in DSM. And I will try not to involve you in a discussion of DSM per se.

I appreciate that that is for another panel.

First of all, I take it, you would agree, that there are a number of links you have to take account of?

A. I don't know whether it is included in the package that you just gave us of interrogatories, but I do believe we prepared an interrogatory response on the role of the end-use forecast in the preparation of the DSM, specifically the electrical efficiency improvement numbers.

Q. All right. So, if I can distil out of that, the point is, quite simply, that certainly, the makeup of the basic and the makeup as analysed in the end-use forecast is something which presents opportunities or limits opportunities for DSM.

A. Yes. I think we will have to be a little more specific to see where that takes us, but ....

Q. Fair enough.

But you have just said that the - let me make sure I understand this - that the DSM potential is, at least in part, based on the premise of an economic structure and level of activity and initial fuel choice and so on, based on the forecast you have constructed for that, that makes up part of the basic.

A. There are two components to estimating a potential for DSM: One is the load that there otherwise would have been at a particular point in time; the second is the expectation by end-use of efficiency improvement possibilities.

And the first part, what load would have been in each end-use or as specifically as we can get it, that is related to the basic forecast.

Q. Fine. So, the assumptions you make, not just about the level of the basic, but things like sectoral makeup, they are going to affect the potential for a particular DSM programs?

A. Yes. To be specific, for instance, if we had - and provocative, just for the heck of it - if we had much more electric space heating in Ontario, then we would also have more potential to be efficient in the use of electric space heating and vice versa.

Q. Okay. Are there distinctions in your load forecast between the high, median and low forecast used throughout the balance of power?

Maybe I should start with you, Doctor. Are there distinctions between those forecasts in terms of the structure or the relative makeup of activities in the economy?

DR. BUJA-BIJUNAS: A. If you are asking

about different end-use forecasts for those three, there is only one end-use forecast. We don't do three separate ones.

Q. All right.

MR. BURKE: A. I think it is clear from our methodology, as outlined in the documents, that there is an uncertainty band for which the lower and median are the ten -- well, lower is the ten per cent and the upper is the 90 per cent point, and the median is what is broken out in detail.

Q. Right. And just to tie this off then, the upper and the lower 80 per cent confidence limits that you just spoke of, they are the principal sources of the upper and lower load forecast projections that are used for planning purposes in the balance of power documentation?

A. For the basic, yes.

Q. Yes.

THE CHAIRMAN: I just wonder, you only make one forecast, is that right? You don't make three separate forecasts.

MR. BURKE: That is correct.

MR. D. POCH: Q. So, even though throughout the balance of power, it is called the upper or the median or low load forecasts, they are not

really forecasts; they are just median forecast, upper uncertainty band, lower uncertainty band.

MR. BURKE: A. I hate to admit - I prefer the word "cases." They are really representative of the entire load forecast distribution.

Q. All right. Wouldn't load growth, if it came to be at the higher, for example, likely involve a different structural makeup? That would be perhaps one of the reasons why load growth changed?

A. Perhaps and perhaps not, unfortunately.

Q. All right.

A. If it was as clear as that, we might have been more ready to split it out.

Q. Okay. Have you done any sensitivity analysis of the relationship between the structure at a rough cut level of the load forecast of the GDP say as between industrial, commercial residential and key components of those and the potential for DSM? If I am getting to the point where we are into detail that I have to ask Panel 4, feel free to tell me and I can...

A. Well, I think it is fair to say that the potential for DSM for the median forecast is

derived from the median basic load forecast.

And if you are asking, how was the DSM potential for the upper and lower cases derived -- is that what you're trying to get at?

Q. Well, we could ask that. Yes, that would be helpful.

A. I think in the DSM report itself, it is laid out in Chapter 7 and in the background paper. The exhibit number escapes me. I will have to look that up.

The translation of the basic band into the primary band is a complex matter and we have also dealt with this in several interrogatories. And I really apologize, but the number of interrogatories that we have had to deal with has meant that I have given up trying to remember any of the numbers --

Q. We are all in that position, Mr. Burke.

A. But there are many elements that go into, I think, doing that properly. And if it were as simple as how does GDP vary, if GDP is high, will the amount of DSM, therefore, be higher and, therefore, primary load lower in a high case?

That is one way of getting a high value for prime rate demand for electricity, but it is also

possible to get the result of a high value for primary load by having median economic growth, very poor success with demand management programs and, therefore, less to subtract from the median load forecast and, as a result, getting a higher prime rate and it's uncertainty in all of these elements that ultimately determines uncertainty in the primary load forecast.

...

[3:27 p.m.] Q. All right. Harkening back to my question or where it stems from, which was the sensitivity of the DSM potential to changes in the basic --

A. Well, there is, because we are focussing for the median case for DSM on the median load forecast and the uncertainty is derived for the basic without alternative cases for the basic, but as a result of the uncertainty band, no, we have not done that.

But, I would point out that with the end-use model, any particular change that you see can be readily quantified -- that you might be interested in can be readily quantified because all of the components are as explicit, as has been described in the documents; that is, market shares, efficiencies, and so on.

If you wish to change the assumption, you can readily generate a different outcome and each and every one of the market shares and intensities and saturations and all that, can be altered. It really presents a myriad of possibilities.

Q. All right. Maybe we can shorten this up a bit. If you just look at the diagram, you will see the various links. I take it you would agree then

that you haven't done a sensitivity analysis per se, but that there is an interaction between each of the components, if you will, and the lags in utilization go in to making the basic, driving the basic, and DSM, and it can go both ways. That is--

A. Yes.

Q. --some changes in any of these assumptions --

A. I guess my point is we don't have to do a lot of sensitivity analysis. All of the elements for calculating the impact of a change in any one of the elements of the forecast are in place, if anyone is particularly interested in some that are different from the case that we have used in the median load forecast.

Q. And from what you have told me, I guess I know the answer to my next question, which is you don't do an iteration then. You don't say, Here is the basic, here is how we forecast it, here is DSM, now let's look how DSM affects those and go around and around?

A. I'm not quite sure why there would be an iteration.

Q. Well, I thought you had just agreed that the level of DSM could affect these just as these could affect the level of DSM?

A. No, I think what I said was that the mix -- if you wanted to change a particular assumption, the basic, it would have implications for DSM. I don't see where feedback exists.

Q. Let's say in DSM you went in and affected the heating appliance, might not that affect other choices, say, fuel choice for water heating?

A. That's what we try to capture in getting a net impact of demand management.

But you picked a bad example because we don't have anything to do with affecting fuel choice in our electrical efficiency improvement programs.

Q. You don't have grants for heat pumps?

A. We have them, I think -- well, I won't speak to the programs we have just in case I am not up to date.

Q. You are aware that you have at least recently had grants are loans and some incentive for heat pumps?

A. Yes, the numbers that are included in the long-term potential, as I understand it, but here we are getting into the substance of the long-term potential, and I am not fully briefed for that, are based on the use of heat pumps to replace resistance heating.

Q. I take it from the fact that you are not aware, or in any detail briefed on what is going on there in terms of that example, then you haven't in turn done an analysis of the effects of that particular DSM program on other parts of your load forecast, the secondary effects?

A. Well, I think I would have to check into the program you are referring to to be sure that it should have any impact on my basic.

Q. Let me give you a hypothetical then that there is such a program where there is some assistance given to get people to go with heat pumps.

A. In new housing or as a retrofit measure?

Q. Say in new housing.

Could you imagine that that would have an impact on some of the other aspects, fuel choice for other services for example? You might not bring a gas line in if you are getting a heat pump anyway, so you go with an electric water heater?

A. Yes. I think we are getting into the substance of the programs where -- okay, as a hypothetical yes. The thing that is confusing me is that you are describing it, I think, as a program that we might be using for electrical efficiency

improvement; and unless you tell me what the alternative was, I am not sure I can tell you whether I think it makes positive or negative difference in --

Q. I wasn't asking you, Mr. Burke, I wasn't asking you to forecast what the effect would be. I was just trying to pick an example - I might have picked a bad one - of a case where DSM program would have secondary effects on choices being made for say other appliances and that would in turn affect your basic. You haven't gone through that kind of a loop analysis?

A. Well, there are certain things, for instance, where lighting measures in DSM affect other end uses in the building. And the analysis of the savings associated with the lighting improvement measure would definitely have to consider the impact on the other end uses, and that is part of the analysis because the way --

Q. That's part of the DSM analysis.

A. That's part of the DSM analysis. And it is netted relatively to what is in the basic. That's why we actually do it on a building-by-building basis.

Q. Well, have you done any sensitivity analysis for very large changes in the scope of the DSM

program?

For example, if we had an energy efficiency target that was two or three times, three times as high, as what's being talked about in the plan, would that not at least through the -- well, would that not affect the basic forecast other than the obvious direct effects on the primary? Would that not also affect the basic forecast?

A. No --

Q. It would affect price of electricity for example?

A. It really depends how it is implemented. It's not obvious to me that there should be a feedback. It really would depend very much on how it was implemented.

Q. Certainly if we had a lot more DSM, paid for by Ontario Hydro, there would be fewer units of electricity sold; right?

A. Yes.

Q. And if we assume that DSM costs something, maybe more, maybe less than the capital supply project that it is displacing, all else being equal, the price per unit of electricity would rise?

A. Yes, that is true, but I think to put it into a context, these are not -- you would have to

have very large expenditures on DSM to make a significant impact on the basic load forecast.

Q. And the range we are talking about two or three billion dollars by the year 2000 aren't of that scale; is that what you are telling me?

A. The direction if that -- I mean that is the gross expenditure. Of course it is not the net impact on revenue because there are some costs saved, as well, because of the impacts of the programs.

But when you think that Ontario Hydro's revenue requirement is of the order of $7-billion a year for ten years, 3-billion -- I mean I'm not doing this properly--

Q. I understand.

A. --it should escalate and all that.

But, I mean, it's not going to make a huge difference to rates; and given the elasticity, it is not going to make a huge difference to demand.

Q. You haven't analyzed at what point that would be a factor, that feedback mechanism?

A. We know what the elasticity is and we know that whatever is going to happen is going to be very small for quite a while. So, with a minus .4 or so result that we are working with price elasticity, we would have to have a very substantial demand management

expenditure by Ontario Hydro.

Q. Let me posit for example. If you went for the entire -- I think you have defined it as cost-effective technical potential for energy efficiency for the year 2000, some 6,000 megawatts, I think, is the latest number.

A. I think we call it "total induced potential".

Q. If you went for that 6,000 megawatts, that would be what?

A. I don't know. You tell me.

Q. What percentage of peak?

A. Oh, percentage of peak?

Q. Or of energy?

Start with peak.

A. 6,000 megawatts on a forecast of roughly 30,000 is roughly 20 per cent reduction in peak --

Q. And if we just say, for the sake of simplicity, assumed it was the same on the energy side - and I appreciate you can't make it a simple change-over like that - and if we assumed again that those measures cost as much as the supply measures that they were displacing, you would have the same revenue requirements spread over a smaller pie of kilowatts

sold; right?

A. Yes.

Q. And in the example I gave, would that be a significant enough impact?

A. It would make a difference and it would increase the price somewhat, and increases in price tend to reduce demand. I don't know. What is large to you? I mean, 5 or 10 per cent reduction in basic?

Q. Well, we just spoke of what number? We just spoke of a 20 per cent; didn't we?

A. We said a 20 per cent reduction -- now we are talking about what the DSM contributes to reducing the basic.

Q. Yes.

A. So that doesn't affect the basic itself.

Q. Let's talk about the primary. If we could reduce the primary to say 20, 25 per cent by going for that.

A. Yes.

Q. That would affect price.

A. Yes. And what I'm saying --

Q. Would it not, on a significant level?

A. Well, you know, I don't know how much

it would cost to get 6,000 megawatts. Do you?

Q. Well, in my hypothetical I gave you, let's assume it would cost the same as your supply program would otherwise cost.

A. Well, I would have to do a little calculation I guess. But, let's put it this way. The 2,000 megawatts is supposedly going to cost us about two or three billion dollars, so being linear about it, you know, we would be up to three times as much. That's being hypothetical.

THE CHAIRMAN: I wonder if we can take the afternoon break now. Fifteen minutes.

MR. D. POCH: Sure.

THE CHAIRMAN: We are going to stop today at quarter to five, no later than quarter to five.

THE REGISTRAR: We will recess for fifteen minutes.

---Recess at 3:41 p.m.

...

---On resuming at 3:57 p.m.

THE REGISTRAR: Please be seated.

MR. B. CAMPBELL: If I could have a moment, Mr. Chairman. Apparently, I had not been out there to chase my witnesses in, and they have missed the time. I will rush out and chase them back in, with the exception of the good Doctor who is always on time.

MR. D. POCH: We could probably speed this considerably by proceeding. (laughter)

---Off the record.

THE CHAIRMAN: Mr. Poch?

MR. D. POCH: Thank you, sir.

Q. We were just speaking before about a relationship between the different components that go into the basic.

MR. BURKE: Excuse me, I left my material.

---Off the record.

MR. D. POCH: Q. Mr. Burke, if this holds you up, please interrupt me. I don't think this will be problem for you.

We were just talking about the relationship between the DSM and the components of the basic, and I was trying to see if you agreed that there were effects both ways. The one example we just gave

was with respect to if there was a very large DSM program, perhaps you put the number of 9- or 10-billion on it, yes that might affect through the price mechanism, for example, the load forecast.

MR. BURKE: A. Yes, that is the one feedback mechanism I believe I have agreed to so far.

Q. All right. And would you agree that with respect to non-utility generation, if there is a greater or lesser program of the non-utility generation variety, that might affect some of the basic factors; for example, a large favourable NUG's rate might encourage particular industries that are candidates for that or might encourage industries to switch over to gas or might encourage them to update processes, that sort of thing.

A. I think we would have to look into the specifics of this larger NUG program that you are talking about to know what effects it would have on industry and how it actually -- how it came about that a larger amount of non-utility generation was available.

Q. As with a large DSM program, you haven't done that analysis, so today you couldn't give me any detailed answer?

A. Yes. But in the case of load

displacement non-utility generation, we are dealing with a very small number.

Q. No, I was thinking of non-utility generation of either genre.

A. Our sense is that most of the non-utility generation is a by-product of the process; it doesn't drive the nature of the process itself and therefore we wouldn't expect the sort of industrial structure of Ontario to be influenced particularly by non-utility generation changes.

Q. All right. And the converse, though, that obviously to the extent there is structural shift, that might create more or less opportunity for non-utility generation?

A. To the extent that there is structural shifts, it might create more or less opportunity for non-utility generation.

Q. Let's take a look at one of the ways we spoke of that Ontario Hydro can influence the basic, and that's marketing.

The regression analyses that you spoke of last week and earlier this week in the LISA model and the EEMO model, I recall you stating that they go back to 1962; is that correct?

A. Yes.

Q. And you would agree that decisions about, say, appliances or fuel choice made in the preceding decades, depending on the life of that appliance decision, would have been affecting where the load was in '62 and following? If someone chose to go electric heat in 1950, they are still going to be electrically heating in '60 and '70, in all likelihood?

A. That is true. What you said earlier, as to why they chose to go electric, that's another issue.

Q. I am not asking that.

A. Sure, if a load existed in 1950 and it persists beyond that, it affects the data after 1950.

Q. All right. So to the extent that your marketing effort has affected those choices really in the whole post-war period, that has affected both the level of the basic and potentially the regression analyses that you have done.

A. Potentially it has, but I don't know how much.

Q. In trying to get a handle on this, we came upon Exhibit 1.12.15, which is in the package in front of you, and that's in the bundle of interrogatories.

Do you have that, Mr. Burke, 1.12.15?

A. I do, yes.

Q. This asked about the role of non-incentive demand management activities of Hydro and what your assumptions about those have been and will be. And you answer that in the '88 load forecast, which I take it is the one that underlies the balance of power, non-incentive demand management activities of Ontario Hydro were assumed to continue to impact load as they had in the past; that is, the position was taken that efficiency improvement had long been a component of Hydro's information transferred to the public.

I would like to test that. Could you turn up Exhibit 108? 108 is samples of Ontario Hydro load building efforts from the '40s and '50s and '60s. It is the thicker of those two bundles, the one with the bulldog clip on it.

A. Sorry, are you at the '40s and '50s, or are you at the '70s and the '80s?

Q. '40s and the '50s and the '60s.

Do you have that now?

A. Yes, I have that now.

Q. Mr. Burke, in considering how this marketing has affected the basic, and in making the

decision to project forward, I want to ask you about a few of the programs that appear throughout these pages and just ask you if you have considered them, all right?

Can you turn to page 1? Trust me, I am not going to take you through every page.

Let me ask you questions about these, Mr. Burke. Could you turn to page 1. Page 1, under the flying lead, "Open Path to Greater Sales," it says:

> "Previous load building practice throughout the province attempted to scale the price of electric ranges to the purse of the lower income group by means of a trade-in allowance. This was, in effect, a subsidy to the range manufacturer."

Have you considered Hydro's past subsidization of electric appliances like that, how that affected where the basic was?

A. I think we can save each other a lot of time, Mr. Poch. I have just worked with the data as it is collected.

Q. So you hadn't considered that? You haven't factored that out?

A. Factored it out?

Q. That's right. To the extent that you you are not going to do that anymore, you haven't made an explicit adjustment in the load forecast to take into account that this occurred throughout the period which you have agreed affects your regression and that you don't intend to do it anymore so you would make an adjustment. You haven't done that explicitly?

A. I have no idea what the net impact of this program, or any of these programs, was.

Q. Okay. Thank you.

A. It's not clear whether any of these programs had a major impact.

Q. Now, throughout these documents, and we can see it at page 4 where it says "The Hydro family assures your electrical future," are you familiar with that term, "Hydro family"?

A. Well, the only understanding of it that I have is referring to the combination of Ontario Hydro and the municipal utilities.

Q. All right. Now Mr. Burke and Dr. Buja-Bijunas, could you turn to page 7? I know I was impressed by this document. It seems that this is an example at page 10, in fact, where there has actually been in Hydro's history an attempt to look at the particular load curve and effects of particular

appliances, in this case electric ranges, and then we see an exhortation there to market appropriately.

Are you aware if this was a common practice, has been a common practice in the corporation in the past to do this kind of end-use study in support of load building, Doctor?

DR. BUJA-BIJUNAS: A. I am personally not aware of that. Whether or not there was, I can't answer to that.

Q. All right. And if we flip ahead to page 18 --

MR. BURKE: A. Can I just ask you a question, Mr. Poch?

THE CHAIRMAN: No, no, I'm sorry. Mr. Poch asks the questions and you give the answers.

MR. BURKE: Okay. Fine.

MR. D. POCH: Q. Flip ahead to page 18.

THE CHAIRMAN: I'm sorry, Mr. Poch, what page?

MR. D. POCH: Page 18.

Q. There we see an ad for a hot water heater and it says, with flat rate automatic electric water heater. Doctor, it seems to me, and I don't need your opinion on this, but that the flat rate was a particular rate structure to encourage this mode, or at

least, it was being marketed that way. Have you in your end-use studies considered how long that flat rate structure and to what extent it's been in use and projected anything different for the future?

DR. BUJA-BIJUNAS: A. What we have underlying the end-use forecast in the residential sector is the residential electricity price forecast. We don't differentiate between rate structures. It is just the residential electricity price forecast.

Q. So if we eliminate all flat rate water heaters, the use of flat rate rate structure, that's not something that you have made either a projection will or won't happen? It is not something that you have considered as a driver?

A. We have not done that, no.

Q. At page 19, in the second paragraph it reads -- First of all, AMEU also appears throughout this. Am I correct that AMEU and OMEA are the precursors to MEA? Is that understanding correct?

...

[4:14 p.m.] MR. ROTHMAN: A. Yes.

Q. Mr. Rothman, you are nodding - okay. All right.

Here it says:

"The Commission"--

I take it this was the Ontario Hydro Electric Commission, which is the previous name for Ontario Hydro -

--"had cancelled the restrictive service charge of $4.00 a kilowatt a month and had authorized electric space heating in accordance with the following conditions..."

So, in doing your regression analysis and looking at whether or not there was other factors that should be taken into account, had you taken into account the fact that, initially, there was a charge to restrict electric heating and then that was removed?

MR. BURKE: A. Well, in the period that we are estimating, '62 to '89, the regime has always been the case that electric heating was charged at the regular rate. It was in the 50s itself that Hydro actively discouraged electric space heating.

Q. All right. Okay. If we flip ahead to page 23, there is an example of a sales campaign by

one of the municipal utilities, Toronto Hydro.

And at the bottom of the first column, the top of the second, the Ontario Hydro News Report discusses how Toronto Hydro had extended credit privileges for purchase of electric appliances and was now going to a different scheme where they -- actually, it sounds like a lease scheme where they are actually buying the appliances from dealers and then financing them for customers.

Have you considered in your load forecast the load building effect that this kind of marketing would have had?

A. I think I am just repeating myself: I don't know that I can measure the impact of these programs and --

Q. So, the answer is, no, you haven't tried or you have tried?

A. I haven't tried.

Q. All right.

A. But to my knowledge, there is no estimate of what difference these programs made to --

Q. But no one would make that estimate but you, Mr. Burke, and you have just said you haven't tried; isn't that right?

A. Well, it could be that the energy

management people might have made such an estimate. I am not aware of that.

Q. Okay. Have you asked them?

A. I believe Mr. Rothman has more of that history than I do.

MR. ROTHMAN: A. We haven't tried to make estimates of the impact of these prior sales promotion programs. We were, of course, aware of them.

Part of what we look at, this would be to say that if in 1958 - to take the example on page 23 - if in 1958 an Ontario Hydro advertising campaign or financing campaign were to have encouraged someone to buy a refrigerator which they might not otherwise have bought at that time, I would expect that given the current history of appliance saturation, that by the time they had come into our historical period, that household would have had a refrigerator anyway.

And that if there was any effect of the these programs - if there was any marginal impact of these programs - that it would probably have damped out over time.

Q. Let me ask you this, Mr. Rothman: I take your comment that for something like an electric refrigerator, there has been market saturation; it might happen faster or slower, but that trend was

there.

Wouldn't it be the case with marketing uses, where other fuels could satisfy them, that there might be some perseverance of that load?

Didn't you give evidence earlier this week, I believe - last week - that once someone has chosen a particular type of furnace, there is very little changeover when the appliance is replaced?

Doctor, do you recall that?

DR. BUJA-BIJUNAS: A. The conversion rate as measured historically has not been very high, except for things like off-oil programs or, you know, things like that, but just the normal ...

Q. All right. So, if we go to page 26, we see electric water heaters being marketed.

MR. BURKE: A. The point, Mr. Poch, is that unless Hydro is offering some specific financial incentive, it is not clear that the information Hydro supplies, in the form of advertising, is changing people's decisions that they wouldn't otherwise have made then or shortly thereafter.

Q. You haven't tested that, Mr. Burke, you just said that a minute ago; isn't that right?

A. I think the reason we haven't tested it is that it is almost impossible to test.

Q. All right. Would you agree with me, if you were effective and you did get people to choose electric water heaters rather than gas, that that is a load that, to some extent, would have persisted?

A. Yes.

Q. All right.

A. It would have persisted. There is an interrogatory response and this one -- and we have referred to numerous so far today, I guess -- but there is an interrogatory response that asks the question whether we could relate our expenditures on advertising to sales historically.

And in that answer, I believe we state that we did not observe a statistically significant relationship between our expenditures to advertise and the sales that we observe.

Q. Has there been a wide variation in the advertising budget? Has it fluctuated a lot?

A. Yes. It has also at different times been, what you might call more promotional, and other times more conservation-oriented. So, we try to take that into account.

But, in fact, we have been unable to identify statistically a relationship between our advertising expenditures and the load in the province.

There are just too many other things that influence load to be able to draw a quantitative conclusion.

MR. ROTHMAN: A. Thank you, Mr. Burke. We did try. We made some attempts to discover whether we could quantify this.

Again, you know, you chose page 26, Mr. Poch, but if you choose your pages 24, 25, 27, all of those are household appliances that are by now quite common and whose saturation rates, even given these advertisements in the late 1950s, I would think would have been pretty much independent of Ontario Hydro advertisement.

Q. We have spoken of that, Mr. Rothman. But if you turn to the later sections of this, into the 60s, there seems to be quite an emphasis on electric home heating.

Would you agree with me that your comment just doesn't apply to that, does it? I am looking, for example, at a document which starts at page 36, "what do we promote?"

And at page 39, I read:

"Electric home heating. Why should we try to sell electric home heating? Everybody knows it is too expensive and that it wastes electricity which is too

valuable for that use."

It goes on to say how it may be more expensive, but it is not too expensive, because it is a better way.

A. Well, we haven't been going around -- we were not going around giving people incentives to reduce the cost differential between electric home heating and other fuel forms.

MR. CONNELL: Excuse me. While there is a pause, I wonder if we could get the citation of the interrogatory that Mr. Burke referred to, not necessarily now.

MR. BURKE: Yes, I will definitely get that one to you.

MR. D. POCH: Q. Now, Mr. Burke, just on that study you did, a lot of the materials in here -- if we look at page 50, there is a little discussion about two hypothetical municipal utilities, one in the Town of Peppy Falls and the other in the Town of Slowpoke, and one has a blighted future and one has done really well and that is because one has gone electric; a municipal utility has marked it electric.

Would you agree with me that there appears to have been quite a concerted effort to get the municipal utilities, the allies, the Hydro family,

to be the instrument of a lot of this marketing?

MR. BURKE: A. I really can't comment on that.

Q. If that was the case, Mr. Burke --

A. This is the Ontario Hydro News you are reading from.

Q. Yes, it is.

A. It isn't some widely-circulated publication or anything. This is...

Q. Right, and that is why I assume its readership is the Hydro family.

A. Well, fine. But it is sometimes -- yes, okay.

Q. All I am saying then, Mr. Burke, to the extent that the marketing has gone on through the municipals, their statistical analysis just wouldn't have caught that because it wouldn't have been your expenditure, would it?

A. To the extent that there were expenditures on their parts, yes.

Q. All right. And what about other types of activity by Hydro? If you look at page 59, you see what is the end, apparently, of Ontario Hydro actually distributing light bulbs.

Now, certainly, this is an example that,

Mr. Rothman would suggest, we are going to see saturation sooner or later anyway.

But were there efforts in the past, that you are aware of, of Hydro going out there and actually selling things like this that might not be considered advertising but were part of the customer service department? Have you looked at that?

THE CHAIRMAN: This was done in the 1920s; am I reading that correctly?

MR. D. POCH: Yes, and it ended in -- well, whenever this is -- this is September '61.

THE CHAIRMAN: But it wasn't done in the 60s.

MR. D. POCH: Yes. And, Mr. Chairman, the point I am getting at with the witnesses is that -- this example is, obviously -- the reason I just spoke of may not be a prime one, but that the efforts made in the 40s and 50s would have persisted into the period which they did their regression analysis on.

THE CHAIRMAN: I see.

MR. D. POCH: Q. So, just, first of all, Mr. Burke, you haven't looked at that kind of activity, I take it.

MR. BURKE: A. Well --

Q. Just answer my question first.

A. Well, the relevance of it escapes me for the particular forecast --

Q. You haven't looked at those kinds of activities, customer service activities.

A. Yes. I don't know whether they actually are positive or negative for load. It is quite possible these were better light bulbs than the ones that are available.

Q. with respect to the regression analysis that you spoke of or advertising, how far back did you go?

A. Well, I think it was for the period which we had information. I don't know, probably --

Q. Could you tell us that?

A. I don't have that information.

Q. Could you find that out for us?

MR. B. CAMPBELL: Which of the many regression analyses that have been --

MR. D. POCH: This is the analysis Mr. Burke spoke of a moment ago, where he said he went and tested to see if there was a correlation between Hydro advertising and effects on load.

MR. B. CAMPBELL: All right.

MR. BURKE: I would just like to point out that if there was an impact - and I think you would

agree Mr. Poch - that the impact would have been more in the 60s and 70s than in the late 70s and 80s of these programs that you are talking about here, that we would then have seen the reduction of these programs impact on load and we would probably be extrapolating into the future than perhaps a decreasing impact of this sort of activity.

MR. D. POCH: Fair enough.

Q. When you do regression analyses, you are looking for sort of long-term as opposed to more recent cyclical kind of change? You said that numerous times.

MR. BURKE: A. The intent of the EEMO model is to capture long-term trends, yes.

Q. So if we, hypothetically, had a marketing effort that went from back in the '40s or '50s to the mid-'80s, your regression analysis would have been showing -- rather, the effect of that would be generally to raise load and raise load in the future for some time, wouldn't it?

A. Yes, if there was a significant effect.

Q. Okay. And just, again, on the point about expenditures outside the Ontario Hydro budget, at page 72, we see a campaign, "United We Sell" in 1962,

and it says:

"Municipal utilities, electrical contractors, dealers, manufacturers and distributors are joining forces, creating an effective industry-wide sales promotion team."

Your study wouldn't have picked any of that up in terms of the expenditure side?

A. What my study picks up is the load that is observed and the activities in Ontario in the econometric end of it, the effect of prices.

To the extent that we have non-price effects influencing market share, they probably alter the results, but as I have said repeatedly, it is very difficult to know how much.

Q. Okay. And let's just look at page 77 to get a sense of the scale of this. This is about electric heating, this particular part of this load building, from '63, "the Medallion Home Promotion."

...

[4:28 p.m.] I am reading from the second full paragraph. It says by the end of the year the total number of electrically heated homes in the province had reached 4,000. Future growth will be aided considerably by rate reductions for electric heating, energy, with a majority of municipal utilities putting into effect during the year, which a majority of municipal utilities put into effect during the year.

So, were you aware that there had actually been rate changes specifically by the municipals to facilitate electric heating through that period?

A. As we have indicated, our aggregate analysis has not taken specific rate structure changes into account.

But something occurs to me as I am sitting here listening to you. We have indicated that we use two different modelling approaches, and you're concentrating on what would have been picked up by the econometric modelling approach.

I would point out to you or remind you that our end-use modelling approach is not influenced by any of this particularly in the sense that it starts from a base level and extends into the future with sort of marginal values that we have described to you. And

it gets a forecast which is slightly lower than the econometric model forecast and it is the end-use forecast we adopted for the residential sector, so that nothing that we are talking about here particularly impacts on our load forecast.

Q. Well, what we have talked about certainly impacts potentially on the EEMO.

A. It potentially does, but we are not using the EEMO in the residential area; and the end-use forecast is not impacted by what you're talking about.

Q. Well, the base year is. You have agreed to that.

A. The level is. Where we start from.

Q. Yes, where we start is.

A. But that doesn't affect the forecast. We are where we start from. I mean, that is a fact. We are here today --

Q. To the extent that you use econometrics inside the -- Doctor, to the extent you use econometrics for, for example, those residual categories, "other" categories--

DR. BUJA-BIJUNAS: A. Yes.

Q. --how were those econometric formulas built? Are they based on regressional history?

A. If you are just referring to the

"other" category, that's a regression equation that, basically, used information from 1973 to 1988, and it was consumption versus income levels in that period.

Q. And the "other", I believe, that's in the commercial or the residential?

A. That's the residential sector.

Q. In the commercial it's called "office equipment" and "miscellaneous"?

A. It's "office equipment" and "miscellaneous."

Q. And that's the one where we saw it accounting for some 74 per cent of the change.

MR. BURKE: A. No, that's not the one.

Q. All right.

DR. BUJA-BIJUNAS: A. It's 42 per cent in the commercial. It's the residential you are referring to.

Q. And the residential we spoke of a minute ago which is driven by econometric, it's --

MR. BURKE: A. No, no.

DR. BUJA-BIJUNAS: A. The other is driven by a regression equation in residential and the "other" --

Q. And it's a large component of the residential growth?

A. Yes, it's the major part, yes.

Q. And in the commercial sector, the comparable piece, which is the "office equipment" and "miscellaneous" category--

A. That's correct.

Q. --42 per cent we just heard, that's driven by a regression?

A. No, it's not.

That growth rate was a judgmental growth rate based on recommendations from other utilities in Canada, other utilities in the United States, consultants, government ministries, how many computers are going to schools these days...

Q. You don't really know what went into it obviously, but --

A. There were a number of people consulted to give us physical evidence of what was going on and that was used for the basis.

MR. BURKE: A. Can I just add a point here? The "other" in the residential sector is, as you know, what is left over after all of these appliance loads that we have been looking at here and the electric space heating is taken out, so that it is not the stuff that's affected here. It is --

Q. Clothes dryers are in "other"; are

they not?

DR. BUJA-BIJUNAS: A. Yes, they are.

Q. And that would be a large part of the "other" category?

A. Clothes dryers --

Q. In the homes that have clothes dryers, it would be a large load in the "other"?

A. Clothes dryers are about a thousand kilowatthours per dryer, yes.

Q. So in the "other" category it is one of the larger ones, right?

A. That's correct. It is also relatively close to saturation so that there is not much change in clothes dryers over the last few years or into history.

MR. ROTHMAN: A. Even if these programs were to have had, as Dr. Buja-Bijunas is starting to point out, some effect, then it isn't clear what effect they might have on the regression result.

As you have pointed out, insofar as they created things like fuel choice, fuel choices that might not otherwise have been made, that would change the level of the load that you are looking at. But insofar as they brought forward choices that would otherwise --

Q. You have made that point three times, Mr. Rothman, I think we understand it.

A. What we do is decrease the growth rates and, therefore, it's possible that they could reduce the forecasted growth rates in a regression equation and that would be true, given the dryer, even for the dryer component that you have been talking about.

Q. As if we got an acceleration at the front end and then it wasn't carried forward--

A. Right.

Q. --if the marketing was stopped sort of thing or tapered off.

A. In that direction, yes.

Q. Well, I am going to just jump ahead a decade or two here to see if the marketing was stopped.

If you turn to Exhibit 109, this is just a few samples from the '70s and '80s. And the first one there is flood lighting.

Now, Mr. Rothman, I think you would agree that is not one where you would necessarily see a big move towards saturation but for marketing. Marketing would have some significant effect; is that fair?

MR. B. CAMPBELL: Just a minute. I am not at all clear that any of these witnesses are

qualified to give evidence on the effect of advertising.

MR. D. POCH: Well, if that's their position and that's your position, Mr. Campbell, I am quite happy with that. If it's the position that they just haven't considered this, that they haven't tried to analyze this and what have you, in their forecast, apart from what they have said, that's fine.

THE CHAIRMAN: I have taken the whole thrust of this latter line of questioning is that they are not able to express an opinion one way or the other on what impact, if any, any of these promotional activities had.

MR. BURKE: And go beyond that. I am not sure whether, even if it did have an impact, it has an impact on the forecast we prepared given the way we prepared it.

MR. D. POCH: Q. Mr. Burke, then, just looking at this very quickly. You see examples of electric heating promotion going through in the '70s and in the '80s. "Go Electric" in '83, a whole campaign, a whole "Go Electric" campaign in '83. '84 and '85, "Stamp Out Cold Feet with Electric Heat."

So, when you said you have been just projecting the trend, the trend would have included

some of this marketing.

MR. BURKE: A. Yes. And as I have said, that trend was a higher forecast than the REEPS' results. We didn't choose the EEMO result for the residential sector. I don't know exactly how much difference it makes to the forecast. It seems to me another good reason to have chosen the REEPS' results to base our forecast on is --

Q. What did the EEMO forecast influence? Which sector?

A. The commercial sector.

Q. All right. Are you aware of what the effort has been? Has there been a marketing effort to increase sales historically in the commercial sector? Have you looked at it?

A. No. But we certainly heavily discounted the EEMO forecast for the commercial sector. There was a 25 terawatthour difference by the end of the period and we only chose to put 5 terawatthours of it into the commercial sector forecast.

Not that I am suggesting that we somehow had the impact that would have projected out 25 years to that difference, but I would hazard to say that we had a lot less impact on the commercial sector than we did on the residential.

Q. Have you studied that? I thought thought you were disavowing any expertise to judge the capability or the effect on load. Are you now telling me you are in a position to judge that?

A. No, I just said I think we had a lot less activity in the commercial sector. The impact of any of this I am not claiming to be able to assess.

Q. Okay.

THE CHAIRMAN: I wonder if we could stop here today, Mr. Poch?

MR. D. POCH: Sure, Mr. Chairman, that's fine. Thank you.

THE CHAIRMAN: Just to remind people, we are sitting tomorrow but not sitting on Thursday.

The Kapuskasing motion which was scheduled for May 10 has now been adjourned to an indefinite date. There is another motion on May 10, that's the Friday -- who is that?

MS. MORRISON: Mr. Hunter, at 9:30.

THE CHAIRMAN: Mr. Hunter's motion on May 10th.

Mr. Poch, you will take some time tomorrow, will you?

MR. D. POCH: I am sure I will take the day tomorrow, sir.

THE CHAIRMAN: Can you give us any sort of rough estimate of how much longer you think you will be?

MR. D. POCH: Unfortunately, it has been going slower than I anticipated. I will try to whittle it down a bit, sir, but I had anticipated two days at the outset. That will take me halfway into the following Monday.

THE CHAIRMAN: You are followed by Northwatch; is that right, Mr. Greenspoon?

MR. GREENSPOON: Yes, sir.

THE CHAIRMAN: Followed by Ontario Public Health - I don't know if there is anyone here from that today - followed by the City of Toronto.

You will keep in touch with those three parties so that they will have some idea of how --

MR. D. POCH: I will, indeed.

THE CHAIRMAN: All right. We will adjourn until tomorrow morning at ten o'clock.

---Whereupon the hearing was adjourned at 4:41 p.m., to be resumed on Wednesday, May 1, 1991, at 10:00 a.m.

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